

SPECIFICATIONS

FOR

***First and Second Floors
HVAC and Electrical Upgrades
at the
Administration Building
for the
Reading School District
800 Washington Street
Reading, PA 19601***

October 15, 2021

Prepared by

CONSOLIDATED ENGINEERS
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Leesport, PA 19533

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CE Project No. 20-2767-2

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ED-1 First Floor Plan Electrical Demolition

ED-2 Second Floor Plan Electrical Demolition

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**First and Second Floor HVAC and Electrical Upgrades
Reading School District Administration Building
October 2021**

The Board of Directors of the Reading School District is soliciting bids for:

*First and Second Floors HVAC and Electrical Upgrades
at the
District Administration Building*

Sealed bids will be received by Mr. Joe Chiarelli, Purchasing Agent, 800 Washington Street Reading, Pennsylvania, 19601 until **10:00am, prevailing time, Monday, November 15, 2021**. At that time and place, bids will be publicly opened and read aloud in the Second Floor Library Conference Room of the Reading School District at 800 Washington Street Reading, Pennsylvania, 19601.

A mandatory pre-bid meeting will be held on **Thursday November 4, 2021 at 10:00am at the Reading Administration Building, at 800 Washington Street Reading, PA 19601**. Contractors shall enter the Administration Building at the Washington Street entrance and check in with Security to sign in prior to the pre-bid meeting. Note the Reading School District has a mandatory mask requirement while inside all Reading School District Buildings.

Bid documents are available electronically in PDF format through Consolidated Engineers at a cost of \$35.00. Contact Consolidated Engineers at 610-916-1600.

All technical questions pertaining to the bid specifications shall be directed electronically to John Schulze at Consolidated Engineers email address johns@cemec.com.

School District reserves the right to waive any informality in bids, or to reject any or all bids, and to make the award in the best interest of the School District.

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project Name:	Reading School District - Administration Bldg. First and Second Floor HVAC & Lighting Renovations
Awarding Agency:	Reading School District
Contract Award Date:	9/25/2021
Serial Number:	21-05422
Project Classification:	Building
Determination Date:	7/14/2021
Assigned Field Office:	Scranton
Field Office Phone Number:	(570)963-4577
Toll Free Phone Number:	(877)214-3962
Project County:	Berks County

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	6/26/2017		\$32.00	\$26.51	\$58.51
Asbestos & Insulation Workers	7/2/2018		\$32.80	\$26.76	\$59.56
Asbestos & Insulation Workers	7/2/2019		\$33.80	\$27.26	\$61.06
Asbestos & Insulation Workers	6/29/2020		\$34.80	\$28.01	\$62.81
Asbestos & Insulation Workers	6/28/2021		\$35.80	\$28.26	\$64.06
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2017		\$28.52	\$18.22	\$46.74
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2018		\$29.52	\$18.22	\$47.74
Boilermaker (Commercial, Institutional, and Minor Repair Work)	1/1/2019		\$29.26	\$18.48	\$47.74
Boilermakers	1/1/2018		\$46.26	\$33.36	\$79.62
Boilermakers	3/1/2018		\$45.89	\$33.73	\$79.62
Boilermakers	1/1/2019		\$45.51	\$34.11	\$79.62
Boilermakers	8/1/2019		\$47.21	\$34.11	\$81.32
Boilermakers	1/1/2021		\$49.32	\$34.90	\$84.22
Bricklayer (Pointer, Cleaner, Caulker, Cement Mason, Plasterer, Tile Setter)	5/1/2018		\$29.40	\$20.35	\$49.75
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2017		\$34.11	\$15.19	\$49.30
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2018		\$34.53	\$15.57	\$50.10
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2019		\$35.04	\$15.96	\$51.00
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/3/2020		\$35.64	\$16.36	\$52.00
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2021		\$36.33	\$16.77	\$53.10
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2017		\$30.05	\$16.05	\$46.10
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2018		\$29.53	\$16.20	\$45.73
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2019		\$30.18	\$16.65	\$46.83
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2020		\$30.88	\$17.10	\$47.98
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2021		\$31.77	\$17.41	\$49.18
Cement Finishers & Plasterers	5/2/2021		\$27.25	\$20.25	\$47.50
Cement Finishers	5/1/2017		\$35.87	\$12.93	\$48.80
Cement Masons	5/1/2019		\$31.00	\$22.68	\$53.68
Cement Masons	5/1/2020		\$30.90	\$20.80	\$51.70
Cement Masons	5/1/2021		\$32.65	\$23.58	\$56.23
DockBuilder/ Divers (Building Heavy & Highway)	5/1/2020		\$52.44	\$37.27	\$89.71
DockBuilder/Pile Drivers (Building, Heavy & Highway)	5/1/2018		\$43.45	\$34.47	\$77.92
DockBuilder/Pile Drivers (Building, Heavy & Highway)	5/1/2020		\$43.70	\$37.27	\$80.97
DockBuilder/Pile Drivers/ Diver Tender (Building Heavy & Highway)	5/1/2020		\$43.70	\$37.27	\$80.97
Dockbuilder/Piledriver (Building, Heavy, Highway)	11/1/2017		\$43.45	\$33.22	\$76.67
Dockbuilder/Piledriver (Building, Heavy, Highway)	5/1/2018		\$44.70	\$33.22	\$77.92

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Drywall Finisher	5/1/2017		\$27.81	\$18.17	\$45.98
Drywall Finisher	5/1/2019		\$28.58	\$19.64	\$48.22
Drywall Finisher	5/1/2020		\$29.33	\$20.01	\$49.34
Drywall Finisher	5/1/2021		\$29.65	\$20.74	\$50.39
Electricians	9/1/2017		\$34.77	\$21.77	\$56.54
Electricians	9/1/2018		\$36.02	\$22.51	\$58.53
Electricians	9/1/2019	8/31/2020	\$36.77	\$23.53	\$60.30
Electricians	9/1/2020		\$37.77	\$24.07	\$61.84
Elevator Constructor	1/1/2018		\$47.48	\$33.00	\$80.48
Floor Coverer	5/1/2019		\$31.54	\$17.89	\$49.43
Floor Coverer	5/1/2020		\$32.66	\$17.89	\$50.55
Glazier	5/1/2017		\$34.69	\$18.05	\$52.74
Glazier	5/1/2018		\$35.69	\$18.35	\$54.04
Glazier	5/1/2019	4/30/2020	\$35.53	\$20.06	\$55.59
Glazier	5/1/2020	4/30/2021	\$35.53	\$21.51	\$57.04
Glazier	5/1/2021		\$35.53	\$22.86	\$58.39
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2017		\$31.33	\$28.42	\$59.75
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2018		\$32.53	\$28.42	\$60.95
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		\$32.76	\$29.88	\$62.64
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2020		\$33.76	\$30.13	\$63.89
Laborers (Class 01 - See notes)	5/1/2017		\$21.57	\$15.04	\$36.61
Laborers (Class 01 - See notes)	5/1/2018	4/30/2019	\$22.07	\$15.59	\$37.66
Laborers (Class 01 - See notes)	5/1/2019	4/30/2020	\$23.02	\$15.92	\$38.94
Laborers (Class 01 - See notes)	5/1/2020		\$23.77	\$16.22	\$39.99
Laborers (Class 01 - See notes)	5/1/2021		\$25.77	\$16.25	\$42.02
Laborers (Class 02 - See notes)	5/1/2017		\$23.57	\$15.04	\$38.61
Laborers (Class 02 - See notes)	5/1/2018		\$24.07	\$15.59	\$39.66
Laborers (Class 02 - See notes)	5/1/2019	4/30/2020	\$25.02	\$15.92	\$40.94
Laborers (Class 02 - See notes)	5/1/2020		\$24.07	\$17.92	\$41.99
Laborers (Class 02 - See notes)	5/1/2020		\$25.77	\$16.22	\$41.99
Laborers (Class 02 - see notes)	5/1/2021		\$27.77	\$16.27	\$44.04
Laborers (Class 03 - See notes)	5/1/2017		\$25.57	\$15.58	\$41.15
Laborers (Class 03 - See notes)	5/1/2018	4/30/2019	\$25.82	\$15.84	\$41.66
Laborers (Class 03 - See notes)	5/1/2019		\$26.87	\$15.94	\$42.81
Laborers (Class 03 - See notes)	5/3/2020		\$27.77	\$16.24	\$44.01
Laborers (Class 03 - See notes)	5/2/2021		\$28.67	\$16.53	\$45.20
Laborers (Class 03 - See notes)	5/1/2022		\$29.62	\$16.24	\$45.86
Laborers (Class 03 - See notes)	4/30/2023		\$30.22	\$16.84	\$47.06
Laborers (Class 04 - See notes)	5/1/2017		\$26.77	\$15.58	\$42.35
Laborers (Class 04 - See notes)	5/1/2018	4/30/2019	\$27.32	\$15.84	\$43.16
Laborers (Class 04 - See notes)	5/1/2019		\$28.37	\$15.94	\$44.31
Laborers (Class 04 - See notes)	5/3/2020		\$29.27	\$16.24	\$45.51

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 04 - See notes)	5/2/2021		\$30.17	\$16.53	\$46.70
Laborers (Class 04 - See notes)	5/1/2022		\$31.12	\$16.24	\$47.36
Laborers (Class 04 - See notes)	4/30/2023		\$31.72	\$16.84	\$48.56
Laborers (Class 05 - See notes)	5/1/2017		\$27.27	\$15.58	\$42.85
Laborers (Class 05 - See notes)	5/1/2018	4/30/2019	\$27.82	\$15.84	\$43.66
Laborers (Class 05 - See notes)	5/1/2019		\$28.87	\$15.94	\$44.81
Laborers (Class 05 - See notes)	5/3/2020		\$29.77	\$16.24	\$46.01
Laborers (Class 05 - See notes)	5/2/2021		\$30.67	\$16.53	\$47.20
Laborers (Class 05 - See notes)	5/1/2022		\$31.62	\$16.24	\$47.86
Laborers (Class 05 - See notes)	4/30/2023		\$32.22	\$16.84	\$49.06
Laborers (Class 06 - See notes)	5/1/2017		\$22.92	\$15.04	\$37.96
Laborers (Class 06 - See notes)	5/1/2018	4/30/2019	\$23.42	\$15.59	\$39.01
Laborers (Class 06 - See notes)	5/1/2019		\$24.37	\$15.92	\$40.29
Laborers (Class 06 - See notes)	5/1/2020		\$24.37	\$16.97	\$41.34
Laborers (Class 06 - See notes)	5/1/2021		\$27.77	\$16.27	\$44.04
Marble Mason	5/1/2017		\$30.14	\$14.75	\$44.89
Marble Mason	5/1/2018		\$30.76	\$15.13	\$45.89
Marble Mason	5/1/2019		\$31.37	\$15.52	\$46.89
Marble Mason	5/1/2020		\$31.97	\$15.92	\$47.89
Marble Mason	5/1/2021		\$32.56	\$16.33	\$48.89
Millwright	7/1/2017		\$36.49	\$18.93	\$55.42
Millwright	5/1/2018		\$37.84	\$19.64	\$57.48
Millwright	5/1/2019		\$39.14	\$20.08	\$59.22
Operators (Building, Class 01 - See Notes)	5/1/2017		\$35.24	\$24.58	\$59.82
Operators (Building, Class 01 - See Notes)	5/1/2018		\$36.78	\$25.03	\$61.81
Operators (Building, Class 01 - See Notes)	5/1/2019		\$36.78	\$27.03	\$63.81
Operators (Building, Class 01 - See Notes)	5/1/2020		\$38.32	\$27.49	\$65.81
Operators (Building, Class 01 - See Notes)	5/1/2021		\$39.87	\$27.94	\$67.81
Operators (Building, Class 01A - See Notes)	5/1/2017		\$37.49	\$25.23	\$62.72
Operators (Building, Class 01A - See Notes)	5/1/2018		\$39.03	\$25.69	\$64.72
Operators (Building, Class 01A - See Notes)	5/1/2019		\$39.03	\$27.69	\$66.72
Operators (Building, Class 01A - See Notes)	5/1/2020		\$40.57	\$28.15	\$68.72
Operators (Building, Class 01A - See Notes)	5/1/2021		\$42.12	\$28.60	\$70.72
Operators (Building, Class 02 - See Notes)	5/1/2017		\$34.96	\$24.49	\$59.45
Operators (Building, Class 02 - See Notes)	5/1/2018		\$36.50	\$24.95	\$61.45
Operators (Building, Class 02 - See Notes)	5/1/2019		\$36.50	\$26.94	\$63.44
Operators (Building, Class 02 - See Notes)	5/1/2020		\$38.05	\$27.39	\$65.44
Operators (Building, Class 02 - See Notes)	5/1/2021		\$39.59	\$27.85	\$67.44
Operators (Building, Class 02A - See Notes)	5/1/2017		\$37.21	\$25.16	\$62.37
Operators (Building, Class 02A - See Notes)	5/1/2018		\$38.75	\$25.61	\$64.36
Operators (Building, Class 02A - See Notes)	5/1/2019		\$38.75	\$27.61	\$66.36
Operators (Building, Class 02A - See Notes)	5/1/2020		\$40.30	\$28.06	\$68.36
Operators (Building, Class 02A - See Notes)	5/1/2021		\$41.84	\$28.52	\$70.36
Operators (Building, Class 03 - See Notes)	5/1/2017		\$32.23	\$23.68	\$55.91

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Building, Class 03 - See Notes)	5/1/2018		\$33.78	\$24.12	\$57.90
Operators (Building, Class 03 - See Notes)	5/1/2019		\$33.78	\$26.13	\$59.91
Operators (Building, Class 03 - See Notes)	5/1/2020		\$35.32	\$26.59	\$61.91
Operators (Building, Class 03 - See Notes)	5/1/2021		\$36.87	\$27.04	\$63.91
Operators (Building, Class 04 - See Notes)	5/1/2017		\$30.33	\$22.12	\$52.45
Operators (Building, Class 04 - See Notes)	5/1/2018		\$32.63	\$23.80	\$56.43
Operators (Building, Class 04 - See Notes)	5/1/2019		\$32.63	\$25.81	\$58.44
Operators (Building, Class 04 - See Notes)	5/1/2020		\$34.18	\$26.26	\$60.44
Operators (Building, Class 04 - See Notes)	5/1/2021		\$35.72	\$26.72	\$62.44
Operators (Building, Class 05 - See Notes)	5/1/2017		\$29.87	\$21.99	\$51.86
Operators (Building, Class 05 - See Notes)	5/1/2018		\$32.18	\$23.69	\$55.87
Operators (Building, Class 05 - See Notes)	5/1/2019		\$32.19	\$25.67	\$57.86
Operators (Building, Class 05 - See Notes)	5/1/2020		\$33.73	\$26.13	\$59.86
Operators (Building, Class 05 - See Notes)	5/1/2021		\$35.27	\$26.59	\$61.86
Operators (Building, Class 06 - See Notes)	5/1/2017		\$29.00	\$21.72	\$50.72
Operators (Building, Class 06 - See Notes)	5/1/2018		\$31.31	\$23.41	\$54.72
Operators (Building, Class 06 - See Notes)	5/1/2019		\$31.31	\$25.41	\$56.72
Operators (Building, Class 06 - See Notes)	5/1/2020		\$32.86	\$25.86	\$58.72
Operators (Building, Class 06 - See Notes)	5/1/2021		\$34.40	\$26.32	\$60.72
Operators (Building, Class 07A- See Notes)	5/1/2017		\$42.44	\$28.13	\$70.57
Operators (Building, Class 07A- See Notes)	5/1/2018		\$44.29	\$28.68	\$72.97
Operators (Building, Class 07A- See Notes)	5/1/2019		\$44.60	\$30.77	\$75.37
Operators (Building, Class 07A- See Notes)	5/1/2020		\$46.46	\$31.31	\$77.77
Operators (Building, Class 07A- See Notes)	5/1/2021		\$48.31	\$31.86	\$80.17
Operators (Building, Class 07B- See Notes)	5/1/2017		\$42.09	\$28.03	\$70.12
Operators (Building, Class 07B- See Notes)	5/1/2018		\$43.95	\$28.58	\$72.53
Operators (Building, Class 07B- See Notes)	5/1/2019		\$44.26	\$30.66	\$74.92
Operators (Building, Class 07B- See Notes)	5/1/2020		\$46.11	\$31.21	\$77.32
Operators (Building, Class 07B- See Notes)	5/1/2021		\$47.96	\$31.77	\$79.73
Painters Class 1 (see notes)	5/1/2017		\$27.25	\$18.17	\$45.42
Painters Class 1 (see notes)	5/1/2019		\$28.31	\$19.77	\$48.08
Painters Class 1 (see notes)	5/1/2020		\$28.91	\$20.42	\$49.33
Painters Class 1 (see notes)	5/1/2021		\$29.51	\$21.07	\$50.58
Painters Class 2 (see notes)	5/1/2017		\$30.15	\$18.17	\$48.32
Painters Class 2 (see notes)	5/1/2019		\$31.21	\$19.78	\$50.99
Painters Class 2 (see notes)	5/1/2020		\$31.81	\$20.43	\$52.24
Painters Class 3 (see notes)	5/1/2017		\$36.25	\$18.17	\$54.42
Piledrivers	5/1/2021		\$43.73	\$37.99	\$81.72
Plasterers (Use Cement Masons)	5/1/2018		\$29.00	\$21.30	\$50.30
Plasterers	5/1/2017		\$24.23	\$21.38	\$45.61
Plasterers	5/1/2019		\$32.08	\$21.86	\$53.94
Plasterers	5/1/2020		\$32.88	\$22.31	\$55.19
Plasterers	5/1/2020		\$27.48	\$20.83	\$48.31
Plasterers	5/1/2021		\$28.33	\$20.98	\$49.31

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
plumber	5/1/2019		\$45.92	\$31.72	\$77.64
plumber	8/1/2020		\$47.43	\$32.86	\$80.29
plumber	5/1/2021		\$49.58	\$33.36	\$82.94
Plumbers	5/1/2017		\$44.39	\$30.60	\$74.99
Roofers (Composition)	5/1/2017		\$36.15	\$30.22	\$66.37
Roofers (Composition)	5/1/2018		\$37.15	\$31.27	\$68.42
Roofers (Composition)	5/1/2019		\$38.35	\$31.80	\$70.15
Roofers (Composition)	5/1/2020		\$39.50	\$32.30	\$71.80
Roofers (Composition)	5/1/2021		\$40.33	\$33.12	\$73.45
Roofers (Shingle)	5/1/2016		\$25.70	\$19.17	\$44.87
Roofers (Shingle)	5/1/2019		\$28.50	\$20.87	\$49.37
Roofers (Shingle)	5/1/2020		\$29.50	\$21.25	\$50.75
Roofers (Slate & Tile)	5/1/2016		\$28.70	\$19.17	\$47.87
Roofers (Slate & Tile)	5/1/2018		\$30.50	\$20.37	\$50.87
Roofers (Slate & Tile)	5/1/2019		\$31.50	\$20.87	\$52.37
Roofers (Slate & Tile)	5/1/2020		\$32.50	\$21.25	\$53.75
Sheet Metal Workers	6/1/2016		\$33.60	\$33.43	\$67.03
Sheet Metal Workers	6/1/2017		\$33.98	\$35.40	\$69.38
Sheet Metal Workers	6/1/2018		\$34.78	\$36.45	\$71.23
Sheet Metal Workers	6/1/2019		\$36.08	\$37.65	\$73.73
Sheet Metal Workers	6/1/2020		\$37.26	\$38.97	\$76.23
Sheet Metal Workers	6/1/2021		\$36.08	\$42.65	\$78.73
Sprinklerfitters	4/1/2017		\$37.40	\$21.74	\$59.14
Sprinklerfitters	4/1/2018		\$38.80	\$22.74	\$61.54
Sprinklerfitters	4/1/2020		\$38.90	\$26.42	\$65.32
Steamfitters	5/1/2017		\$46.99	\$32.67	\$79.66
Steamfitters	5/1/2019		\$49.93	\$35.82	\$85.75
Steamfitters	5/1/2020		\$51.73	\$37.07	\$88.80
Steamfitters	5/1/2021		\$53.08	\$38.87	\$91.95
Terrazzo Finisher	5/1/2017		\$31.64	\$15.62	\$47.26
Terrazzo Finisher	5/1/2018		\$32.35	\$15.91	\$48.26
Terrazzo Finisher	5/1/2019		\$33.04	\$16.22	\$49.26
Terrazzo Finisher	5/1/2020		\$32.26	\$18.48	\$50.74
Terrazzo Finisher	5/1/2021		\$33.23	\$19.03	\$52.26
Terrazzo Grinder	5/1/2020		\$32.95	\$18.48	\$51.43
Terrazzo Grinder	5/1/2021		\$33.94	\$19.03	\$52.97
Terrazzo Mechanics	5/1/2020		\$32.91	\$20.11	\$53.02
Terrazzo Mechanics	5/1/2021		\$33.83	\$20.78	\$54.61
Terrazzo Setter	5/1/2017		\$30.63	\$18.85	\$49.48
Terrazzo Setter	5/1/2018		\$31.23	\$19.25	\$50.48
Terrazzo Setter	5/1/2019		\$31.81	\$19.67	\$51.48
Tile & Marble Finisher	5/1/2017		\$26.89	\$13.86	\$40.75
Tile & Marble Finisher	5/1/2018		\$27.60	\$14.15	\$41.75
Tile & Marble Finisher	5/1/2019		\$28.29	\$14.46	\$42.75

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Tile & Marble Finisher	5/1/2020		\$28.96	\$14.79	\$43.75
Tile & Marble Finisher	5/1/2021		\$29.61	\$15.14	\$44.75
Tile Setter	5/1/2017		\$30.14	\$14.75	\$44.89
Tile Setter	5/1/2018		\$30.76	\$15.13	\$45.89
Tile Setter	5/1/2019		\$31.37	\$15.52	\$46.89
Tile Setter	5/1/2020		\$31.97	\$15.92	\$47.89
Tile Setter	5/1/2020		\$31.97	\$15.92	\$47.89
Tile Setter	5/1/2021		\$32.36	\$16.53	\$48.89
Truckdriver class 1(see notes)	5/1/2017		\$34.47	\$0.00	\$34.47
Truckdriver class 1(see notes)	5/1/2018		\$35.32	\$0.00	\$35.32
Truckdriver class 1(see notes)	5/1/2019		\$36.12	\$0.00	\$36.12
Truckdriver class 1(see notes)	5/1/2020		\$36.92	\$10.73	\$47.65
Truckdriver class 1(see notes)	5/1/2021		\$37.72	\$11.02	\$48.74
Truckdriver class 2 (see notes)	5/1/2017		\$34.54	\$0.00	\$34.54
Truckdriver class 2 (see notes)	5/1/2018		\$35.39	\$0.00	\$35.39
Truckdriver class 2 (see notes)	5/1/2019		\$36.19	\$0.00	\$36.19
Truckdriver class 2 (see notes)	5/1/2020		\$37.48	\$10.73	\$48.21
Truckdriver class 2 (see notes)	5/1/2020		\$36.99	\$10.73	\$47.72
Truckdriver class 2 (see notes)	5/1/2021		\$37.79	\$11.02	\$48.81
Truckdriver class 2 (see notes)	5/1/2021		\$38.28	\$11.02	\$49.30
Truckdriver class 3 (see notes)	5/1/2017		\$35.03	\$0.00	\$35.03
Truckdriver class 3 (see notes)	5/1/2018		\$35.88	\$0.00	\$35.88
Truckdriver class 3 (see notes)	5/1/2019		\$36.68	\$0.00	\$36.68
Window Film / Tint Installer	6/1/2019		\$24.52	\$12.08	\$36.60

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter - Chief of Party (Surveying & Layout)	5/1/2019	4/30/2020	\$36.88	\$15.49	\$52.37
Carpenter - Chief of Party (Surveying & Layout)	5/1/2020	4/30/2021	\$39.12	\$15.49	\$54.61
Carpenter - Chief of Party (Surveying & Layout)	5/1/2021		\$41.42	\$15.49	\$56.91
Carpenter - Instrument Person (Surveying & Layout)	5/1/2016		\$27.12	\$13.83	\$40.95
Carpenter - Instrument Person (Surveying & Layout)	5/1/2019	4/30/2020	\$32.07	\$15.49	\$47.56
Carpenter - Instrument Person (Surveying & Layout)	5/1/2020	4/30/2021	\$34.02	\$15.49	\$49.51
Carpenter - Instrument Person (Surveying & Layout)	5/1/2021		\$36.02	\$15.49	\$51.51
Carpenter - Rodman I (Survey & Layout)	5/1/2016		\$21.09	\$13.83	\$34.92
Carpenter - Rodman I (Survey & Layout)	5/1/2019	4/30/2020	\$25.66	\$12.39	\$38.05
Carpenter - Rodman I (Survey & Layout)	5/1/2020	4/30/2021	\$27.22	\$12.39	\$39.61
Carpenter - Rodman I (Survey & Layout)	5/1/2021		\$28.82	\$12.39	\$41.21
Carpenter - Rodman II (Survey & Layout)	5/1/2016		\$18.69	\$13.83	\$32.52
Carpenter	5/1/2019	4/30/2020	\$32.07	\$15.49	\$47.56
Carpenter	5/1/2020	4/30/2021	\$34.02	\$15.49	\$49.51
Carpenter	5/1/2021		\$36.02	\$15.49	\$51.51
Carpenters	6/1/2017		\$30.92	\$14.14	\$45.06
Cement Finishers	1/1/2017		\$27.70	\$20.20	\$47.90
DockBuilder/ Divers (Building Heavy & Highway)	5/1/2020		\$52.44	\$37.27	\$89.71
DockBuilder/Pile Drivers/ Diver Tender(Building Heavy & Highway)	5/1/2020		\$43.70	\$37.27	\$80.97
Electric Lineman	5/29/2017		\$44.22	\$23.94	\$68.16
Electric Lineman	5/28/2018		\$45.25	\$24.94	\$70.19
Electric Lineman	5/27/2019		\$46.32	\$25.97	\$72.29
Electric Lineman	6/1/2020		\$47.42	\$27.04	\$74.46
Electric Lineman	5/31/2021		\$49.22	\$27.36	\$76.58
Electric Lineman	5/30/2022		\$50.28	\$28.47	\$78.75
Electric Lineman	5/29/2023		\$51.40	\$29.62	\$81.02
Electric Lineman	6/3/2024		\$52.80	\$30.61	\$83.41
Electricians	6/1/2022		\$44.46	\$23.06	\$67.52
Electricians	6/1/2023		\$46.49	\$23.06	\$69.55
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2017		\$31.33	\$28.42	\$59.75
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2018		\$32.53	\$28.42	\$60.95
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		\$32.76	\$29.88	\$62.64
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2020		\$33.76	\$30.13	\$63.89
Iron Workers	7/1/2106		\$31.95	\$27.65	\$59.60
Laborers (Class 01 - See notes)	5/1/2016		\$19.81	\$15.79	\$35.60
Laborers (Class 01 - See notes)	5/1/2017		\$20.36	\$16.29	\$36.65
Laborers (Class 01 - See notes)	5/1/2018		\$20.96	\$16.79	\$37.75
Laborers (Class 01 - See notes)	5/1/2019		\$21.61	\$17.29	\$38.90
Laborers (Class 01 - See notes)	5/1/2020		\$22.41	\$17.69	\$40.10
Laborers (Class 01 - See notes)	5/1/2021		\$23.21	\$18.09	\$41.30
Laborers (Class 01 - See notes)	5/1/2022		\$24.01	\$18.54	\$42.55

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 01 - See notes)	5/1/2023		\$24.81	\$18.99	\$43.80
Laborers (Class 01 - See notes)	5/1/2024		\$25.61	\$19.49	\$45.10
Laborers (Class 02 - See notes)	5/1/2016		\$26.43	\$15.79	\$42.22
Laborers (Class 02 - See notes)	5/1/2017		\$26.98	\$16.29	\$43.27
Laborers (Class 02 - See notes)	5/1/2018		\$27.58	\$16.79	\$44.37
Laborers (Class 02 - See notes)	5/1/2019		\$28.23	\$17.29	\$45.52
Laborers (Class 02 - See notes)	5/1/2020		\$29.03	\$17.69	\$46.72
Laborers (Class 02 - See notes)	5/1/2021		\$29.83	\$18.09	\$47.92
Laborers (Class 02 - See notes)	5/1/2022		\$30.63	\$18.54	\$49.17
Laborers (Class 02 - See notes)	5/1/2023		\$31.43	\$18.99	\$50.42
Laborers (Class 02 - See notes)	5/1/2024		\$32.23	\$19.49	\$51.72
Laborers (Class 03 - See notes)	5/1/2016		\$23.42	\$15.79	\$39.21
Laborers (Class 03 - See notes)	5/1/2017		\$23.97	\$16.29	\$40.26
Laborers (Class 03 - See notes)	5/1/2018		\$24.57	\$16.79	\$41.36
Laborers (Class 03 - See notes)	5/1/2019		\$25.22	\$17.29	\$42.51
Laborers (Class 03 - See notes)	5/1/2020		\$26.02	\$17.69	\$43.71
Laborers (Class 03 - See notes)	5/1/2021		\$26.82	\$18.09	\$44.91
Laborers (Class 03 - See notes)	5/1/2022		\$27.62	\$18.54	\$46.16
Laborers (Class 03 - See notes)	5/1/2023		\$28.42	\$18.99	\$47.41
Laborers (Class 03 - See notes)	5/1/2024		\$29.22	\$19.49	\$48.71
Laborers (Class 04 - See notes)	5/1/2016		\$23.77	\$15.79	\$39.56
Laborers (Class 04 - See notes)	5/1/2017		\$24.32	\$16.29	\$40.61
Laborers (Class 04 - See notes)	5/1/2018		\$24.92	\$16.79	\$41.71
Laborers (Class 04 - See notes)	5/1/2019		\$25.57	\$17.29	\$42.86
Laborers (Class 04 - See notes)	5/1/2020		\$26.37	\$17.69	\$44.06
Laborers (Class 04 - See notes)	5/1/2021		\$27.17	\$18.09	\$45.26
Laborers (Class 04 - See notes)	5/1/2022		\$27.97	\$18.54	\$46.51
Laborers (Class 04 - See notes)	5/1/2023		\$28.77	\$18.99	\$47.76
Laborers (Class 04 - See notes)	5/1/2024		\$29.57	\$19.49	\$49.06
Laborers (Class 05 - See notes)	5/1/2016		\$24.44	\$15.79	\$40.23
Laborers (Class 05 - See notes)	5/1/2017		\$24.99	\$16.29	\$41.28
Laborers (Class 05 - See notes)	5/1/2018		\$25.59	\$16.79	\$42.38
Laborers (Class 05 - See notes)	5/1/2019		\$26.24	\$17.29	\$43.53
Laborers (Class 05 - See notes)	5/1/2020		\$27.04	\$17.69	\$44.73
Laborers (Class 05 - See notes)	5/1/2021		\$27.84	\$18.09	\$45.93
Laborers (Class 05 - See notes)	5/1/2022		\$28.64	\$18.54	\$47.18
Laborers (Class 05 - See notes)	5/1/2023		\$29.44	\$18.99	\$48.43
Laborers (Class 05 - See notes)	5/1/2024		\$30.24	\$19.49	\$49.73
Laborers (Class 06 - See notes)	5/1/2016		\$23.86	\$15.79	\$39.65
Laborers (Class 06 - See notes)	5/1/2017		\$24.41	\$16.29	\$40.70
Laborers (Class 06 - See notes)	5/1/2018		\$25.01	\$16.79	\$41.80
Laborers (Class 06 - See notes)	5/1/2019		\$25.66	\$17.29	\$42.95
Laborers (Class 06 - See notes)	5/1/2020		\$26.46	\$17.69	\$44.15
Laborers (Class 06 - See notes)	5/1/2021		\$27.26	\$18.09	\$45.35

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 06 - See notes)	5/1/2022		\$28.06	\$18.54	\$46.60
Laborers (Class 06 - See notes)	5/1/2023		\$28.86	\$18.99	\$47.85
Laborers (Class 06 - See notes)	5/1/2024		\$29.66	\$19.49	\$49.15
Laborers (Class 07 - See notes)	5/1/2016		\$24.15	\$15.79	\$39.94
Laborers (Class 07 - See notes)	5/1/2017		\$24.70	\$16.29	\$40.99
Laborers (Class 07 - See notes)	5/1/2018		\$25.30	\$16.79	\$42.09
Laborers (Class 07 - See notes)	5/1/2019		\$25.95	\$17.29	\$43.24
Laborers (Class 07 - See notes)	5/1/2020		\$26.75	\$17.69	\$44.44
Laborers (Class 07 - See notes)	5/1/2021		\$27.55	\$18.09	\$45.64
Laborers (Class 07 - See notes)	5/1/2022		\$28.35	\$18.54	\$46.89
Laborers (Class 07 - See notes)	5/1/2023		\$29.15	\$18.99	\$48.14
Laborers (Class 07 - See notes)	5/1/2024		\$29.95	\$19.49	\$49.44
Laborers (Class 08 - See notes)	5/1/2016		\$24.63	\$15.79	\$40.42
Laborers (Class 08 - See notes)	5/1/2017		\$25.18	\$16.29	\$41.47
Laborers (Class 08 - See notes)	5/1/2018		\$25.78	\$16.79	\$42.57
Laborers (Class 08 - See notes)	5/1/2019		\$26.43	\$17.29	\$43.72
Laborers (Class 08 - See notes)	5/1/2020		\$27.23	\$17.69	\$44.92
Laborers (Class 08 - See notes)	5/1/2021		\$28.03	\$18.09	\$46.12
Laborers (Class 08 - See notes)	5/1/2022		\$28.83	\$18.54	\$47.37
Laborers (Class 08 - See notes)	5/1/2023		\$29.63	\$18.99	\$48.62
Laborers (Class 08 - See notes)	5/1/2024		\$30.43	\$19.49	\$49.92
Operators (Class 02 - All Types of Cranes, Backhoes, Shovels)	5/1/2019		\$33.29	\$25.99	\$59.28
Operators (Heavy, Class 01 - See Notes)	5/1/2016		\$32.16	\$22.64	\$54.80
Operators (Heavy, Class 01 - See Notes)	5/1/2017		\$33.80	\$24.16	\$57.96
Operators (Heavy, Class 01 - See Notes)	5/1/2018		\$35.35	\$24.61	\$59.96
Operators (Heavy, Class 01 - See Notes)	5/1/2019		\$35.35	\$26.61	\$61.96
Operators (Heavy, Class 01 - See Notes)	5/1/2020		\$36.90	\$27.06	\$63.96
Operators (Heavy, Class 01 - See Notes)	5/1/2021		\$38.44	\$27.52	\$65.96
Operators (Heavy, Class 01A - See Notes)	5/1/2017		\$36.05	\$24.82	\$60.87
Operators (Heavy, Class 01A - See Notes)	5/1/2018		\$37.60	\$25.27	\$62.87
Operators (Heavy, Class 01A - See Notes)	5/1/2019		\$37.60	\$27.27	\$64.87
Operators (Heavy, Class 01A - See Notes)	5/1/2020		\$39.14	\$27.73	\$66.87
Operators (Heavy, Class 01A - See Notes)	5/1/2021		\$40.69	\$28.18	\$68.87
Operators (Heavy, Class 02 - See Notes)	5/1/2017		\$33.52	\$24.07	\$57.59
Operators (Heavy, Class 02 - See Notes)	5/1/2018		\$35.07	\$24.52	\$59.59
Operators (Heavy, Class 02 - See Notes)	5/1/2019		\$35.07	\$26.52	\$61.59
Operators (Heavy, Class 02 - See Notes)	5/1/2020		\$36.61	\$26.98	\$63.59
Operators (Heavy, Class 02 - See Notes)	5/1/2021		\$38.16	\$27.43	\$65.59
Operators (Heavy, Class 02A - See Notes)	5/1/2017		\$35.78	\$24.72	\$60.50
Operators (Heavy, Class 02A - See Notes)	5/1/2018		\$37.32	\$25.19	\$62.51
Operators (Heavy, Class 02A - See Notes)	5/1/2019		\$37.32	\$27.19	\$64.51
Operators (Heavy, Class 02A - See Notes)	5/1/2020		\$38.87	\$27.64	\$66.51
Operators (Heavy, Class 02A - See Notes)	5/1/2021		\$40.41	\$28.10	\$68.51
Operators (Heavy, Class 03 - See Notes)	5/1/2017		\$30.60	\$23.21	\$53.81

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Heavy, Class 03 - See Notes)	5/1/2018		\$32.15	\$23.66	\$55.81
Operators (Heavy, Class 03 - See Notes)	5/1/2019		\$32.15	\$25.66	\$57.81
Operators (Heavy, Class 03 - See Notes)	5/1/2020		\$33.69	\$26.12	\$59.81
Operators (Heavy, Class 03 - See Notes)	5/1/2021		\$35.24	\$26.57	\$61.81
Operators (Heavy, Class 04 - See Notes)	5/1/2017		\$29.47	\$22.88	\$52.35
Operators (Heavy, Class 04 - See Notes)	5/1/2018		\$31.01	\$23.32	\$54.33
Operators (Heavy, Class 04 - See Notes)	5/1/2019		\$31.01	\$25.33	\$56.34
Operators (Heavy, Class 04 - See Notes)	5/1/2020		\$32.55	\$25.79	\$58.34
Operators (Heavy, Class 04 - See Notes)	5/1/2021		\$34.10	\$26.24	\$60.34
Operators (Heavy, Class 05 - See Notes)	5/1/2017		\$29.02	\$22.74	\$51.76
Operators (Heavy, Class 05 - See Notes)	5/1/2018		\$30.56	\$23.20	\$53.76
Operators (Heavy, Class 05 - See Notes)	5/1/2019		\$30.56	\$25.20	\$55.76
Operators (Heavy, Class 05 - See Notes)	5/1/2020		\$32.11	\$25.65	\$57.76
Operators (Heavy, Class 05 - See Notes)	5/1/2021		\$33.65	\$26.11	\$59.76
Operators (Heavy, Class 06 - See Notes)	5/1/2017		\$28.14	\$22.49	\$50.63
Operators (Heavy, Class 06 - See Notes)	5/1/2018		\$29.68	\$22.93	\$52.61
Operators (Heavy, Class 06 - See Notes)	5/1/2019		\$29.68	\$24.94	\$54.62
Operators (Heavy, Class 06 - See Notes)	5/1/2020		\$31.23	\$25.39	\$56.62
Operators (Heavy, Class 06 - See Notes)	5/1/2021		\$32.77	\$25.84	\$58.61
Operators (Heavy, Class 07A - See Notes)	5/1/2017		\$40.73	\$27.63	\$68.36
Operators (Heavy, Class 07A - See Notes)	5/1/2018		\$42.58	\$28.18	\$70.76
Operators (Heavy, Class 07A - See Notes)	5/1/2019		\$42.89	\$30.27	\$73.16
Operators (Heavy, Class 07A - See Notes)	5/1/2020		\$44.74	\$30.82	\$75.56
Operators (Heavy, Class 07A - See Notes)	5/1/2021		\$46.59	\$31.37	\$77.96
Operators (Heavy, Class 07B - See Notes)	5/1/2017		\$40.38	\$27.53	\$67.91
Operators (Heavy, Class 07B - See Notes)	5/1/2018		\$42.23	\$28.09	\$70.32
Operators (Heavy, Class 07B - See Notes)	5/1/2019		\$42.54	\$30.17	\$72.71
Operators (Heavy, Class 07B - See Notes)	5/1/2020		\$44.39	\$30.72	\$75.11
Operators (Heavy, Class 07B - See Notes)	5/1/2021		\$46.25	\$31.26	\$77.51
Operators (Highway, Class 01 - See Notes)	5/1/2016		\$32.16	\$22.64	\$54.80
Operators (Highway, Class 01 - See Notes)	5/1/2017		\$32.93	\$23.87	\$56.80
Operators (Highway, Class 01 - See Notes)	5/1/2018		\$34.47	\$24.33	\$58.80
Operators (Highway, Class 01 - See Notes)	5/1/2019		\$34.47	\$26.33	\$60.80
Operators (Highway, Class 01 - See Notes)	5/1/2020		\$37.56	\$25.24	\$62.80
Operators (Highway, Class 01 - See Notes)	5/1/2021		\$39.10	\$25.70	\$64.80
Operators (Highway, Class 01a - See Notes)	5/1/2017		\$35.18	\$24.56	\$59.74
Operators (Highway, Class 01a - See Notes)	5/1/2018		\$36.72	\$25.01	\$61.73
Operators (Highway, Class 01a - See Notes)	5/1/2019		\$36.72	\$27.01	\$63.73
Operators (Highway, Class 01a - See Notes)	5/1/2020		\$39.81	\$25.92	\$65.73
Operators (Highway, Class 01a - See Notes)	5/1/2021		\$41.35	\$26.38	\$67.73
Operators (Highway, Class 02 - See Notes)	5/1/2016		\$30.98	\$22.31	\$53.29
Operators (Highway, Class 02 - See Notes)	5/1/2017		\$31.75	\$23.53	\$55.28
Operators (Highway, Class 02 - See Notes)	5/1/2018		\$33.30	\$23.98	\$57.28
Operators (Highway, Class 02 - See Notes)	5/1/2019		\$33.29	\$25.99	\$59.28

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Highway, Class 02 - See Notes)	5/1/2020		\$36.38	\$24.90	\$61.28
Operators (Highway, Class 02 - See Notes)	5/1/2021		\$37.93	\$25.35	\$63.28
Operators (Highway, Class 03 - See Notes)	5/1/2016		\$30.28	\$22.10	\$52.38
Operators (Highway, Class 03 - See Notes)	5/1/2017		\$31.06	\$23.32	\$54.38
Operators (Highway, Class 03 - See Notes)	5/1/2018		\$32.59	\$23.80	\$56.39
Operators (Highway, Class 03 - See Notes)	5/1/2019		\$32.59	\$25.79	\$58.38
Operators (Highway, Class 03 - See Notes)	5/1/2020		\$35.69	\$24.69	\$60.38
Operators (Highway, Class 03 - See Notes)	5/1/2021		\$37.23	\$25.16	\$62.39
Operators (Highway, Class 04 - See Notes)	5/1/2016		\$29.82	\$21.98	\$51.80
Operators (Highway, Class 04 - See Notes)	5/1/2017		\$30.60	\$23.20	\$53.80
Operators (Highway, Class 04 - See Notes)	5/1/2018		\$32.14	\$23.66	\$55.80
Operators (Highway, Class 04 - See Notes)	5/1/2019		\$32.14	\$25.66	\$57.80
Operators (Highway, Class 04 - See Notes)	5/1/2020		\$35.23	\$24.57	\$59.80
Operators (Highway, Class 04 - See Notes)	5/1/2021		\$36.77	\$25.03	\$61.80
Operators (Highway, Class 05 - See Notes)	5/1/2016		\$29.31	\$21.83	\$51.14
Operators (Highway, Class 05 - See Notes)	5/1/2017		\$30.08	\$23.06	\$53.14
Operators (Highway, Class 05 - See Notes)	5/1/2018		\$31.63	\$23.51	\$55.14
Operators (Highway, Class 05 - See Notes)	5/1/2019		\$31.63	\$25.51	\$57.14
Operators (Highway, Class 05 - See Notes)	5/1/2020		\$34.72	\$24.42	\$59.14
Operators (Highway, Class 05 - See Notes)	5/1/2021		\$36.26	\$24.87	\$61.13
Operators (Highway, Class 06 - See Notes)	5/1/2016		\$32.40	\$22.70	\$55.10
Operators (Highway, Class 06 - See Notes)	5/1/2017		\$33.17	\$23.94	\$57.11
Operators (Highway, Class 06 - See Notes)	5/1/2018		\$34.71	\$24.39	\$59.10
Operators (Highway, Class 06 - See Notes)	5/1/2019		\$34.71	\$26.39	\$61.10
Operators (Highway, Class 06 - See Notes)	5/1/2020		\$36.25	\$26.85	\$63.10
Operators (Highway, Class 06 - See Notes)	5/1/2021		\$39.33	\$25.78	\$65.11
Operators (Highway, Class 06/A - See Notes)	5/1/2016		\$34.65	\$23.36	\$58.01
Operators (Highway, Class 06/A - See Notes)	5/1/2017		\$35.42	\$24.59	\$60.01
Operators (Highway, Class 06/A - See Notes)	5/1/2018		\$36.96	\$25.05	\$62.01
Operators (Highway, Class 06/A - See Notes)	5/1/2019		\$36.96	\$27.05	\$64.01
Operators (Highway, Class 06/A - See Notes)	5/1/2020		\$40.04	\$25.97	\$66.01
Operators (Highway, Class 06/A - See Notes)	5/1/2021		\$41.58	\$26.43	\$68.01
Operators (Highway, Class 07/A - See Notes)	5/1/2016		\$38.56	\$25.99	\$64.55
Operators (Highway, Class 07/A - See Notes)	5/1/2017		\$39.66	\$27.31	\$66.97
Operators (Highway, Class 07/A - See Notes)	5/1/2018		\$41.52	\$27.84	\$69.36
Operators (Highway, Class 07/A - See Notes)	5/1/2019		\$41.82	\$29.95	\$71.77
Operators (Highway, Class 07/A - See Notes)	5/1/2020		\$45.23	\$28.94	\$74.17
Operators (Highway, Class 07/A - See Notes)	5/1/2021		\$47.08	\$29.49	\$76.57
Operators (Highway, Class 07/B - See Notes)	5/1/2016		\$37.17	\$25.57	\$62.74
Operators (Highway, Class 07/B - See Notes)	5/1/2017		\$38.25	\$26.89	\$65.14
Operators (Highway, Class 07/B - See Notes)	5/1/2018		\$40.10	\$27.44	\$67.54
Operators (Highway, Class 07/B - See Notes)	5/1/2019		\$40.41	\$29.53	\$69.94
Operators (Highway, Class 07/B - See Notes)	5/1/2020		\$43.81	\$28.53	\$72.34
Operators (Highway, Class 07/B - See Notes)	5/1/2021		\$45.66	\$29.08	\$74.74

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05422 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Painters Class 2 (see notes)	5/1/2020		\$31.81	\$20.43	\$52.24
Painters Class 2 (see notes)	5/1/2021		\$32.41	\$21.08	\$53.49
Painters Class 3 (see notes)	5/1/2019		\$37.31	\$19.78	\$57.09
Painters Class 3 (see notes)	5/1/2020		\$37.91	\$20.43	\$58.34
Painters Class 3 (see notes)	5/1/2021		\$38.51	\$21.08	\$59.59
Piledrivers	5/1/2021		\$43.73	\$37.99	\$81.72
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2017		\$40.98	\$32.53	\$73.51
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2020		\$57.45	\$36.93	\$94.38
Truckdriver class 1(see notes)	5/1/2016		\$33.57	\$0.00	\$33.57
Truckdriver class 1(see notes)	5/1/2017		\$34.47	\$0.00	\$34.47
Truckdriver class 1(see notes)	5/1/2018		\$35.32	\$0.00	\$35.32
Truckdriver class 1(see notes)	5/1/2019		\$36.12	\$0.00	\$36.12
Truckdriver class 1(see notes)	5/1/2020		\$36.92	\$10.73	\$47.65
Truckdriver class 1(see notes)	5/1/2021		\$37.72	\$11.02	\$48.74
Truckdriver class 2 (see notes)	5/1/2016		\$33.64	\$0.00	\$33.64
Truckdriver class 2 (see notes)	5/1/2017		\$34.54	\$0.00	\$34.54
Truckdriver class 2 (see notes)	5/1/2018		\$35.39	\$0.00	\$35.39
Truckdriver class 2 (see notes)	5/1/2019		\$36.19	\$0.00	\$36.19
Truckdriver class 2 (see notes)	5/1/2020		\$37.48	\$10.73	\$48.21
Truckdriver class 2 (see notes)	5/1/2020		\$36.99	\$10.73	\$47.72
Truckdriver class 2 (see notes)	5/1/2021		\$38.28	\$11.02	\$49.30
Truckdriver class 2 (see notes)	5/1/2021		\$37.79	\$11.02	\$48.81
Truckdriver class 3 (see notes)	5/1/2016		\$34.13	\$0.00	\$34.13
Truckdriver class 3 (see notes)	5/1/2017		\$35.03	\$0.00	\$35.03
Truckdriver class 3 (see notes)	5/1/2018		\$35.88	\$0.00	\$35.88
Truckdriver class 3 (see notes)	5/1/2019		\$36.68	\$0.00	\$36.68

BID FORM

CONTRACT NO.1 GENERAL CONSTRUCTION

*First and Second Floors HVAC and Electrical Upgrades
at the
District Administration Building
for
Reading School District*

Bid of: First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building

To: Mr. Joe Chiarelli, Purchasing Agent, Reading, PA

In conformity with the Drawings and Specifications as prepared by Consolidated Engineers, 1022 James Drive, Leesport, Pennsylvania for the First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building (the "Project"), and after an examination of the site and the Bidding and Contract Documents, including the Advertisement, Instructions to Bidders, Bid Form, Bid Bond, Qualification Statement, General Conditions as modified, Standard Form of Agreement, Performance Bond and Payment Bond, Insurance Requirements, and Technical Specifications and Drawings, the undersigned submits this Bid and encloses herewith as a bond on the form enclosed, furnished by Reading School District (the "District"), in an amount of not less than ten percent (10%) of the total of the hereinafter stated Base Bid, made payable to or indemnifying the District, 800 Washington Street Reading, Pennsylvania. The District shall hold this bid security, as provided in the Instructions to Bidders, if this Bid or any part thereof is accepted by the District, and the undersigned shall fail to furnish approved bonds and execute the Agreement within ten (10) days from the date of issuance of the award. Should the District fail to make an award on this Project through no fault or failure on the part of the Bidder, then the District shall return said bid security.

It is hereby certified that the undersigned is the only person(s) interested in this Bid as principal, and that the Bid is made without collusion with any person, firm, or corporation. The Bidder submits herewith, as such, a Non-Collusion Affidavit in accordance with the provisions of the Pennsylvania Antibid-Rigging Act, 62 Pa.C.S. Section 4501 et seq.

Bidder hereby agrees to execute the Agreement and furnish surety company bonds in the form incorporated in the Contract Documents, in the amount of one-hundred percent (100%) of the Contract Sum for the Performance Bond and Payment Bond, within ten (10) days after mailing by the School Board of notice of award, and to begin work within ten (10) days after date of Notice to Proceed.

Bidder guarantees that, if awarded the Contract, he will furnish and deliver all materials, tools, equipment, tests, transportation, secure all permits and licenses, do and perform all labor, superintendence and all means of construction, pay all fees and do all incidental work, and to execute, construct and finish, in an expeditious, substantial and workmanlike manner, in accordance with the Drawings and Specifications, to the complete satisfaction and acceptance of the District, for First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building. It is understood that the District Board of School Directors (the "School Board"), reserves the right to reject any or all bids, or part thereof, or items therein and to waive technicalities required for the best interest of the District. It is further understood that competency and responsibility of bidders will receive consideration before the award of the Contract. A certified copy of the Contractor's Qualification Statement, AIA Document A305 shall be submitted.

When the Bidder is a Partnership:

_____ (SEAL)

Witness

By: _____ (SEAL) _____ (SEAL)

Partners

When the Bidder is a Corporation: (CORPORATE SEAL)

_____ ATTEST:

Secretary

By: _____
President

_____ is a Corporation organized

and existing under the Laws of _____ and has (has not) been granted a Certificate of Authority to do Business in Pennsylvania, as required by the Business Corporation Law, approved May 5, 1933, P. L. 364, as amended to date.

END OF SECTION 00300

BID FORM

CONTRACT NO.2 HVAC CONSTRUCTION

*First and Second Floors HVAC and Electrical Upgrades
at the
District Administration Building
for
Reading School District*

Bid of: First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building

To: Mr. Joe Chiarelli, Purchasing Agent, Reading, PA

In conformity with the Drawings and Specifications as prepared by Consolidated Engineers, 1022 James Drive, Leesport, Pennsylvania for the First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building (the "Project"), and after an examination of the site and the Bidding and Contract Documents, including the Advertisement, Instructions to Bidders, Bid Form, Bid Bond, Qualification Statement, General Conditions as modified, Standard Form of Agreement, Performance Bond and Payment Bond, Insurance Requirements, and Technical Specifications and Drawings, the undersigned submits this Bid and encloses herewith as a bond on the form enclosed, furnished by Reading School District (the "District"), in an amount of not less than ten percent (10%) of the total of the hereinafter stated Base Bid, made payable to or indemnifying the District, 800 Washington Street Reading, Pennsylvania. The District shall hold this bid security, as provided in the Instructions to Bidders, if this Bid or any part thereof is accepted by the District, and the undersigned shall fail to furnish approved bonds and execute the Agreement within ten (10) days from the date of issuance of the award. Should the District fail to make an award on this Project through no fault or failure on the part of the Bidder, then the District shall return said bid security.

It is hereby certified that the undersigned is the only person(s) interested in this Bid as principal, and that the Bid is made without collusion with any person, firm, or corporation. The Bidder submits herewith, as such, a Non-Collusion Affidavit in accordance with the provisions of the Pennsylvania Antbid-Rigging Act, 62 Pa.C.S. Section 4501 et seq.

Bidder hereby agrees to execute the Agreement and furnish surety company bonds in the form incorporated in the Contract Documents, in the amount of one-hundred percent (100%) of the Contract Sum for the Performance Bond and Payment Bond, within ten (10) days after mailing by the School Board of notice of award, and to begin work within ten (10) days after date of Notice to Proceed.

Bidder guarantees that, if awarded the Contract, he will furnish and deliver all materials, tools, equipment, tests, transportation, secure all permits and licenses, do and perform all labor, superintendence and all means of construction, pay all fees and do all incidental work, and to execute, construct and finish, in an expeditious, substantial and workmanlike manner, in accordance with the Drawings and Specifications, to the complete satisfaction and acceptance of the District, for First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building. It is understood that the District Board of School Directors (the "School Board"), reserves the right to reject any or all bids, or part thereof, or items therein and to waive technicalities required for the best interest of the District. It is further understood that

**First and Second Floor HVAC and Electrical Upgrades
Reading School District Administration Building
October 2021**

competency and responsibility of bidders will receive consideration before the award of the Contract. A certified copy of the Contractor's Qualification Statement, AIA Document A305 shall be submitted.

Bidder submits this Bid with the understanding that the work shall be completed on or before October 31, 2022; in accordance with the schedule; and, that time for completion of the work shall be considered as of the essence of this Contract. The Project start date shall be Immediately after School Board approval and Contract signing. A detailed breakdown sheet of the work, and the Contract Sum of the work involved, shall be submitted to the Engineer, within fifteen (15) calendar days after the execution of the Contract.

The Bidder agrees that he will not assign his Bid or any of his rights or interests thereunder without the written consent of the School Board.

SUBMITTALS: The Bidder agrees to submit shop drawings for the First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building within two (2) weeks after the Contract is fully executed.

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

BASE BID, Contract No.2 HVAC Construction

_____ Dollars
(\$ _____)

ALTERNATES

ALTERNATE BID M-1 VRF System - (Trane/Mitsubishi)

State the costs to be added to, or deducted from the base bid to use Trane/Mitsubishi VRF system in lieu of the base bid Daiken System. Alternate unit must meet all the specifications of the BASE BID. Equipment, capacities and electrical characteristics must meet the values listed in the contract documents.

_____ Dollars
(\$ _____)

ALTERNATE BID M-2 VRF System - (JCI/Hatachi)

State the costs to be added to, or deducted from the base bid to use JCI/Hatachi VRF system in lieu of the base bid Daiken System. Alternate unit must meet all the specifications of the BASE BID. Equipment, capacities and electrical characteristics must meet the values listed in the contract documents.

_____ Dollars
(\$ _____)

ALTERNATE BID M-3 (BAS Control Integration)

State the costs to be added to the base bid to provide control system provided by JCI. The JCI control system shall fully integrate with the VRF control panel specified with this project as well as the existing Daikin panel for the third floor. The HC will have to include in this alternate replacing the existing communication card in the existing Daikin panel. In addition, JCI will provide a separate DDC control panel, (BACnet/IP), for secondary systems including, but not limited to, unit heaters, cabinet heaters, convectors, pump status, boiler status and duct heaters. Under this alternate the new JCI panel will replace the existing secondary DDC panel which serves the third- floor secondary systems. These points will need to be wired to the new JCI panel. JCI will include all programming and graphics required.

_____ Dollars

(\$ _____)

UNIT PRICES

The Undersigned hereby agrees that each Unit Price submitted represents full compensation for either additions to or deductions from the Contract Sum for extra work or changes ordered under the Contract, as specified for Unit prices under instructions to Bidders and Division 1 "General Requirements".

Unit Price No. HVAC 1: 1 1/8" Refrigerant Piping \$ _____.

Unit Price No. HVAC 2: 1 1/2" Condensate Piping \$ _____.

Unit Price No. HVAC 3: 12"X 8" Ductwork \$ _____.

ALLOWANCES

The Undersigned hereby agrees that the sums indicated for each labor and material allowance is included in the Base Bid and is work that is in addition to the required work of the Contract. The undersigned further certifies that the labor and material sums for each allowance shall be established using the listed. Unit Price indicated on this Bid Form, except where alternative direction is provided in the allowance description. The Undersigned agrees that unused allowance sums will be deducted from the Contract amount by Change Order.

Allowance No. HVAC 1: 200'-0" of 1 1/8" Refrigerant Piping \$ _____.

Allowance No. HVAC 2: 200'-0" of 1 1/2" Condensate Piping \$ _____.

Allowance No. HVAC 3: 160'-0" of 12" x 8" Ductwork \$ _____.

**First and Second Floor HVAC and Electrical Upgrades
Reading School District Administration Building
October 2021**

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

<u>Addendum No.</u>	<u>Dated</u>
_____	_____
_____	_____
_____	_____

The undersigned certifies that the Contract Documents have been considered, in their entirety, both before and in the preparation of this Bid. The undersigned, in submitting this Bid, intends to be legally bound by this Bid.

IN WITNESS WHEREOF, the undersigned has caused this Bid to be executed as of

_____. Date

When the Bidder is an Individual:

_____	_____ (SEAL)
Witness	Bidder

When the Bidder is a Partnership:

_____	_____ (SEAL)
Witness	

By: _____ (SEAL)	_____ (SEAL)
	_____ (SEAL)

Partners

When the Bidder is a Corporation: (CORPORATE SEAL)

_____ ATTEST:

Secretary

By: _____
President

_____ is a Corporation organized

and existing under the Laws of _____ and has (has not)
been granted a Certificate of Authority to do Business in Pennsylvania, as required by the Business
Corporation Law, approved May 5, 1933, P. L. 364, as amended to date.

END OF SECTION 00300

BID FORM

CONTRACT NO.3 ELECTRICAL CONSTRUCTION

*First and Second Floors HVAC and Electrical Upgrades
at the
District Administration Building
for
Reading School District*

Bid of: First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building

To: Mr. Joe Chiarelli, Purchasing Agent, Reading, PA

In conformity with the Drawings and Specifications as prepared by Consolidated Engineers, 1022 James Drive, Leesport, Pennsylvania for the First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building (the "Project"), and after an examination of the site and the Bidding and Contract Documents, including the Advertisement, Instructions to Bidders, Bid Form, Bid Bond, Qualification Statement, General Conditions as modified, Standard Form of Agreement, Performance Bond and Payment Bond, Insurance Requirements, and Technical Specifications and Drawings, the undersigned submits this Bid and encloses herewith as a bond on the form enclosed, furnished by Reading School District (the "District"), in an amount of not less than ten percent (10%) of the total of the hereinafter stated Base Bid, made payable to or indemnifying the District, 800 Washington Street Reading, Pennsylvania. The District shall hold this bid security, as provided in the Instructions to Bidders, if this Bid or any part thereof is accepted by the District, and the undersigned shall fail to furnish approved bonds and execute the Agreement within ten (10) days from the date of issuance of the award. Should the District fail to make an award on this Project through no fault or failure on the part of the Bidder, then the District shall return said bid security.

It is hereby certified that the undersigned is the only person(s) interested in this Bid as principal, and that the Bid is made without collusion with any person, firm, or corporation. The Bidder submits herewith, as such, a Non-Collusion Affidavit in accordance with the provisions of the Pennsylvania Antbid-Rigging Act, 62 Pa.C.S. Section 4501 et seq.

Bidder hereby agrees to execute the Agreement and furnish surety company bonds in the form incorporated in the Contract Documents, in the amount of one-hundred percent (100%) of the Contract Sum for the Performance Bond and Payment Bond, within ten (10) days after mailing by the School Board of notice of award, and to begin work within ten (10) days after date of Notice to Proceed.

Bidder guarantees that, if awarded the Contract, he will furnish and deliver all materials, tools, equipment, tests, transportation, secure all permits and licenses, do and perform all labor, superintendence and all means of construction, pay all fees and do all incidental work, and to execute, construct and finish, in an expeditious, substantial and workmanlike manner, in accordance with the Drawings and Specifications, to the complete satisfaction and acceptance of the District, for First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building. It is understood that the District Board of School Directors (the "School Board"), reserves the right to reject any or all bids, or part thereof, or items therein and to waive technicalities required for the best interest of the District. It is further understood that competency and responsibility of bidders will receive consideration before the award of the Contract. A certified copy of the Contractor's Qualification Statement, AIA Document A305 shall be submitted.

When the Bidder is a Corporation: (CORPORATE SEAL)

_____ ATTEST:

Secretary

By: _____
President

_____ is a Corporation organized

and existing under the Laws of _____ and has (has not) been granted a Certificate of Authority to do Business in Pennsylvania, as required by the Business Corporation Law, approved May 5, 1933, P. L. 364, as amended to date.

END OF SECTION 00300

BID FORM

CONTRACT NO.4 PLUMBING CONSTRUCTION

*First and Second Floors HVAC and Electrical Upgrades
at the
District Administration Building
for
Reading School District*

Bid of: First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building

To: Mr. Joe Chiarelli, Purchasing Agent, Reading, PA

In conformity with the Drawings and Specifications as prepared by Consolidated Engineers, 1022 James Drive, Leesport, Pennsylvania for the First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building (the "Project"), and after an examination of the site and the Bidding and Contract Documents, including the Advertisement, Instructions to Bidders, Bid Form, Bid Bond, Qualification Statement, General Conditions as modified, Standard Form of Agreement, Performance Bond and Payment Bond, Insurance Requirements, and Technical Specifications and Drawings, the undersigned submits this Bid and encloses herewith as a bond on the form enclosed, furnished by Reading School District (the "District"), in an amount of not less than ten percent (10%) of the total of the hereinafter stated Base Bid, made payable to or indemnifying the District, 800 Washington Street Reading, Pennsylvania. The District shall hold this bid security, as provided in the Instructions to Bidders, if this Bid or any part thereof is accepted by the District, and the undersigned shall fail to furnish approved bonds and execute the Agreement within ten (10) days from the date of issuance of the award. Should the District fail to make an award on this Project through no fault or failure on the part of the Bidder, then the District shall return said bid security.

It is hereby certified that the undersigned is the only person(s) interested in this Bid as principal, and that the Bid is made without collusion with any person, firm, or corporation. The Bidder submits herewith, as such, a Non-Collusion Affidavit in accordance with the provisions of the Pennsylvania Antbid-Rigging Act, 62 Pa.C.S. Section 4501 et seq.

Bidder hereby agrees to execute the Agreement and furnish surety company bonds in the form incorporated in the Contract Documents, in the amount of one-hundred percent (100%) of the Contract Sum for the Performance Bond and Payment Bond, within ten (10) days after mailing by the School Board of notice of award, and to begin work within ten (10) days after date of Notice to Proceed.

Bidder guarantees that, if awarded the Contract, he will furnish and deliver all materials, tools, equipment, tests, transportation, secure all permits and licenses, do and perform all labor, superintendence and all means of construction, pay all fees and do all incidental work, and to execute, construct and finish, in an expeditious, substantial and workmanlike manner, in accordance with the Drawings and Specifications, to the complete satisfaction and acceptance of the District, for First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building. It is understood that the District Board of School Directors (the "School Board"), reserves the right to reject any or all bids, or part thereof, or items therein and to waive technicalities required for the best interest of the District. It is further understood that competency and responsibility of bidders will receive consideration before the award of the Contract. A certified copy of the Contractor's Qualification Statement, AIA Document A305 shall be submitted.

**First and Second Floor HVAC and Electrical Upgrades
Reading School District Administration Building
October 2021**

Bidder submits this Bid with the understanding that the work shall be completed on or before October 31, 2022; in accordance with the schedule; and, that time for completion of the work shall be considered as of the essence of this Contract. The Project start date shall be Immediately after School Board approval and Contract signing. A detailed breakdown sheet of the work, and the Contract Sum of the work involved, shall be submitted to the Engineer, within fifteen (15) calendar days after the execution of the Contract.

The Bidder agrees that he will not assign his Bid or any of his rights or interests thereunder without the written consent of the School Board.

SUBMITTALS: The Bidder agrees to submit shop drawings for the First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building within two (2) weeks after the Contract is fully executed.

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

BASE BID, Contract No.4 Plumbing Construction

_____ Dollars
(\$ _____)

ALTERNATES

ALTERNATE BID P-1 Hardwired Flush Valves and Faucets

State the costs to be added to, or deducted from the base bid to provide hardwired flush valve sensors in lieu of the base bid Battery operated flush valves.

_____ Dollars
(\$ _____)

UNIT PRICES

The Undersigned hereby agrees that each Unit Price submitted represents full compensation for either additions to or deductions from the Contract Sum for extra work or changes ordered under the Contract, as specified for Unit prices under instructions to Bidders and Division 1 "General Requirements".

Unit Price No. PC 1: 1" Copper Pipe/Fittings \$ _____.

Unit Price No. PC 1: 4" Cast Iron Pipe/Fitting \$ _____.

ALLOWANCES

The Undersigned hereby agrees that the sums indicated for each labor and material allowance is included in the Base Bid and is work that is in addition to the required work of the Contract. The undersigned further certifies that the labor and material sums for each allowance shall be established using the listed Unit Price indicated on this Bid Form, except where alternative direction is provided in the allowance description. The

When the Bidder is a Corporation: (CORPORATE SEAL)

_____ ATTEST:

Secretary

By: _____
President

_____ is a Corporation organized

and existing under the Laws of _____ and has (has not) been granted a Certificate of Authority to do Business in Pennsylvania, as required by the Business Corporation Law, approved May 5, 1933, P. L. 364, as amended to date.

END OF SECTION 00300

SECTION 00480 - NON-COLLUSION AFFIDAVIT

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

This Non-Collusion Affidavit is material to any contract awarded pursuant to this bid. According to the Pennsylvania Antbid-Rigging Act, 62 Pa.C.S. Section 4501 et seq., governmental agencies may require Non-Collusion Affidavits to be submitted together with bids.

This Non-Collusion Affidavit must be executed by the members, officer, or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.

Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval, or submission of this bid.

In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party. The term "complementary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.

Failure to file an Affidavit in compliance with these instructions may result in disqualification of the bid.

NON-COLLUSION AFFIDAVIT

CONTRACT First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building

STATE OF Pennsylvania:

COUNTY OF Berks:

I state that I am _____ of
(Title)

(Name of Firm)

and that I am authorized to make this affidavit on behalf of my firm, its owners, directors and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

1. The price(s) and amount of this bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder, or potential bidder.

2. Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.
3. No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.
4. The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.
5. My firm, its affiliates, subsidiaries, owners, directors, officers and employees are not currently under investigation by any governmental agency and have not, in the last three (3) years, been convicted or found liable for any act prohibited by State or Federal law, in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as follows:

6. A statement above that a person or firm has been so convicted or found liable does not prohibit

(Name of Public Entity)

from accepting a bid from or awarding a contract to such bidder, but may be a ground for consideration by

(Name of Public Entity)

on the question of declining to award a contract to the bidder on the basis of a lack of responsibility.

I state that _____
(Name of Firm)

understands and acknowledges that the above representations are material and important, and will be relied on by

(Name of Public Entity)

in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from

(Name of Public Entity)

of the true facts relating to the submission of bids for this contract.

(Signature)

(Name and Title)

(Name of Firm)

SWORN TO AND SUBSCRIBED BEFORE ME ON THIS

_____ DAY OF _____, 20____.

(NOTARY PUBLIC)

MY COMMISSION EXPIRES ON: _____.

END OF SECTION 00480



AIA[®] Document A701™ – 2018

Instructions to Bidders

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

Admin HVAC Phase II (Floors 1 and 2 and Basement) Project

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

Reading School District
800 Washington Street
Reading, PA 19601

THE ARCHITECT/ENGINEER (hereinafter and for purposes of this document and the contract documents, the "Architect"):
(Name, legal status, address, and other information)

Consolidated Engineer
1022 James Drive
Leesport, PA 19533

TABLE OF ARTICLES

- 1 DEFINITIONS
- 2 BIDDER'S REPRESENTATIONS
- 3 BIDDING DOCUMENTS
- 4 BIDDING PROCEDURES
- 5 CONSIDERATION OF BIDS
- 6 POST-BID INFORMATION
- 7 PERFORMANCE BOND AND PAYMENT BOND
- 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

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

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

ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

(Paragraph Deleted)

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

Via email to johns@cemec.com. No oral questions from Bidders will be reviewed or accepted. No questions shall be submitted directly to the Owner.

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

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

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

Via email provided that an email address for the Bidder is known.

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

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

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid. Failure of any Bidder to receive such Addenda shall not relieve such Bidder from any obligation under its Bid as submitted.

Bids shall be accompanied with two complete original counterparts of each of the following documents, submitted using forms included in the Bidding Documents in the following order:

1. Bid Form;
2. Bid Bond or other form of Bid Security specifically permitted herein;
3. Agreement of Surety, including Power of Attorney;
4. Non-Collusion Affidavit; and
5. Statement of Bidder's Qualifications and Financial Disclosure.

By including a Non-Collusion Affidavit as an attachment to its bid, Bidder acknowledges the following:

.1 The Non-Collusion Affidavit is material to any contract awarded pursuant to this Bid. According to the Pennsylvania Anti-Bid-Rigging Act, 62 Pa. C.S.A § 4501, et seq., governmental agencies may require Non-Collusion Affidavits be submitted together with Bids.

.2 The Non-Collusion Affidavit must be executed by the member, officer or employee of the Bidder who makes the final decision on prices and the amount quoted in the Bid.

.3 Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of Bids are unlawful and may be subject to criminal prosecution. The person who signs the Non-Collusion Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the Bidder with responsibilities for the preparation, approval or submission of the Bid.

.4 In the case of a Bid submitted by a joint venture, each party to the venture must be identified on the Bid Form and a separate Non-Collusion Affidavit must be submitted separately on behalf of each party.

.5 The term "complementary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of Bids higher than the Bid of another firm, any intentionally high or non-competitive Bid, and any other form of Bid submitted for the purpose of giving a false appearance of competition.

.6 Failure to include an executed Non-Collusion Affidavit with its Bid in compliance with these instructions may result in disqualification of the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

Each Bid must be accompanied by certified check, bank check, cashier's check, treasurer's check or Bid Bond in the form included herein in the amount of ten percent (10%) of the total amount of the Bid drawn to the order of Reading School District. If the Bidder receiving a Notice of Intent to Award shall fail to execute the Contract, furnish the required Performance Bond and Payment Bond, Waiver of Liens/Mechanics' Lien Waiver, Verification Form required by the Pennsylvania Employment Verification Act ("Verification Form") and/or certificate of insurance evidencing the insurance coverages required by the General Conditions within seven (7) calendar days after receipt of the Notice of Intent to Award (a "Defaulting Bidder"), the Owner may apply the bid security toward the difference between the amount of the Bid of the Defaulting Bidder as accepted by the Owner and any higher amount for which the Owner may contract for the required Work, plus any advertising costs, legal fees, damages, penalties, and any and all other fees and expenses incurred by the Owner by reason of the failure of such Defaulting Bidder to comply herewith. If the amount of said damages exceeds the penal sum of the bid security, the Defaulting Bidder shall pay the Owner the full amount of the excess. If the Owner does not procure an executed contract with any other party for the performance of the Work within thirty (30) days after the acceptance of the Bid from the Defaulting Bidder, whether because of the lack of other Bids or the inability or refusal of any other Bidder to contract, or because the cost under any higher Bid would be greater than the Owner would afford, as determined in the sole discretion of the Owner, then in that event, the Defaulting Bidder and its Surety shall pay to the Owner the full amount of the bid security as liquidated damages and not as penalty.

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

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

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been

awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

Bids are to be hand delivered or delivered by traceable means to the Reading School District Administration Building, Attention: Joe Chiarelli, Purchasing Manager, 800 Washington Street, Reading, Pennsylvania, 19601, by 11:00 a.m. on Monday, November 15, 2021. Bids received by US Postal Service, telephone facsimile machine (FAX) or email will NOT be accepted.

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

Negligence by Bidder in preparing its Bid confers no right of withdrawal or modification of its Bid after such Bid has been opened. No claims on account of mistakes or omissions in any Bid will be considered. Notwithstanding the above, a Bidder may withdraw its Bid after such Bid has been opened in accordance with the causes set forth in the Pennsylvania Bid Withdrawal Act, Act No. 4 of 1974, 73 P.S. §1601 et seq. Strict compliance with said Bid Withdrawal Act is required to withdraw a Bid after the Bid Deadline.

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

§ 4.4.3

Bids shall be irrevocable for sixty (60) days after the actual day of opening thereof unless delayed by the required approval of another governmental agency, the sale of bonds or the award of a grant, in which case, Bids shall be irrevocable for one hundred twenty (120) days after the Bid Deadline. Extensions of the date for the award of contract may be made by the mutual written consent of Owner and the lowest responsible and responsive Bidder.

In the event the Prevailing Wage Rates included with the Bidding Document expire after the opening of Bids, but before the award of the Contract, the Bidder agrees that an updated determination of the Prevailing Wage Rates shall be obtained from the Secretary of Labor and Industry and that the Bidder, if awarded the Contract, will pay the Prevailing Wage Rates set forth in such updated determination in accordance with the requirements of the General Conditions, as amended. Under such circumstances, the Bidder agrees that it will not withdraw its Bid nor be entitled to

increase the amount Bid or the Contract Sum, as applicable.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.2.1 Any Bid which contains omissions, additions or deductions not called for or permitted, alteration of forms, conditional or uninvited alternate proposals or irregularities of any kind may be rejected by the Owner, and any Bid which is not based upon the Bidding Documents and any Bid which, while otherwise regular in form, shall not be accompanied by proper Bid Security may be rejected by the Owner, in its sole and absolute discretion.

§ 5.2.2 The Bidder, in the completion of the Bid Form, shall insert Unit Prices where applicable. In the event any Unit Price, in the opinion of the Owner, is unreasonable or unbalanced, the Owner reserves the right to refuse or re-negotiate any or all such Unit Prices.

§ 5.2.3 The Bid of any Bidder or Bidders who engage in collusive bidding shall be rejected. Any Bidder who submits more than one Bid in such manner as to make it appear that the Bids submitted are on a competitive basis from different parties shall be considered a collusive Bidder. However, nothing in this section shall prevent a Bidder from submitting a subsequent Bid after withdrawing a prior Bid.

§ 5.2.4 The Owner may waive irregularities in a Bid, but is under no obligation to do so.

§ 5.2.5 The Owner shall have the right to reject any or all Bids for any reason whatsoever and to reject a Bid not accompanied by any information required by the Bidding Documents, to reject a Bid which is in any way incomplete, irregular or otherwise not responsive to the requirements of the Bidding Documents, or to reject the Bid of a Bidder who is not qualified in accordance with the requirements of the Bid. The Owner reserves the right to waive any informalities and technicalities in bidding and reserves the right to act in its own best interest. Without limiting the foregoing, the Owner shall have the right to reject a Bid if the Bidder has failed to comply with all applicable standards, codes, laws, ordinances, regulations and/or requirements of any state, federal or other agency on any previous project.

§ 5.2.6 If for any reason whatsoever, the Owner rejects Bidder's Bid, Bidder agrees that it will not seek to recover profits on Work not performed nor will it seek to recover its Bid preparation costs.

§ 5.3 Acceptance of Bid (Award)

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

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

§ 5.3.3 In the event of a dispute between a Bidder and the Owner regarding the Owner's determination of which Bidder is the lowest responsive, responsible Bidder, such contesting Bidder shall be responsible for any legal fees (e.g., fees of attorneys, paralegals and other legal professionals), professional fees, or other costs or expenses incurred by the Owner to the extent the Bidder does not completely prevail in such contest. Furthermore, under no circumstances shall the Owner be responsible for any legal fees, professional fees, or other costs or expenses incurred by the contesting Bidder if the Owner decides not to award the Contract to such Bidder based upon the Owner's determination in its sole and absolute discretion that such contesting Bidder is not the lowest responsive, responsible Bidder.

§ 5.3.4 If the Owner elects to proceed with the Project, the Owner, either through the Architect or its legal counsel, will issue a Notice of Intent to Award to the lowest, responsible Bidder. Issuance of the Notice of Intent to Award shall not be construed as a binding contract or offer by the Owner and may include conditions precedent to the issuance of the Award of the Contract if deemed prudent by the Owner.

§ 5.3.5 The Work to be performed for this Project is public work and may be financed by the Owner (a public body) by issuance of certain bonds, the issuance of which may be subject to various qualifications and restrictions. The Owner, in good faith, intends to consummate any necessary financing, but its ability to do so is subject to many factors beyond its control. It is therefore expressly understood and agreed to by each Bidder that, notwithstanding any other provision of the Contract Documents, the Owner may cancel any award made by it or cancel any Contract entered into with any Bidder without liability to the Bidder, at any time before the Bidder has been given a written Notice to Proceed and has actually begun Work under the Contract, if financing satisfactory to the Owner cannot reasonably be consummated as contemplated or if any court of competent jurisdiction shall enjoin or otherwise prohibit the Owner from proceeding with the Work.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

(Paragraphs Deleted)

§ 6.3 Submittals

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

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.
- .4 A separate and complete Verification Form required by the Public Works Employment Verification Act, 43 P.S. § 167.1, et seq., for itself acknowledging its responsibilities and its compliance with the Public Works Employment Verification Act as a precondition of the Owner's Award of the Contract. The Verification Form shall be obtained from the Secretary of the Pennsylvania Department of General Services and shall include a certification that the information is true and correct, subject to sanctions provided by law. The respective Verification Form shall be executed by a representative who has sufficient knowledge and authority to make the representations and certifications contained in the Verification Form.
- .5 A fully executed Performance Bond on the form included in the Bidding Documents
- .6 A fully executed Payment Bond on the form included in the Bidding Documents
- .7 A fully executed Waiver of Liens/Mechanics' Lien Waiver on the form included in this Project Manual.
- .8 The duly executed Contract, as prepared by Owner based on the amount Bid.
- .9 A Certificate of Insurance evidencing the insurance coverages and endorsements required to be maintained by the Contractor pursuant to Article 11 of the General Conditions.

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 The Bidder shall furnish a performance bond and payment bond, each with a penal sum equal to 100% of the Contract Sum, covering the faithful performance of the Contract and payment of all obligations arising thereunder within seven (7) days of the Notice of Intent to Award the Contract.

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

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

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than seven days following receipt of the Notice of Intent to Award the Contract.

§ 7.2.2 The surety bonds required shall have as surety thereon a corporation duly authorized to conduct business in Pennsylvania and which is in accordance with the Contract Documents.

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

- .2 Insurance and Bonds as required in bid materials.

(Insert the complete AIA Document number, including year, and Document title.)

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

(Paragraphs Deleted)

- .5 Drawings included in bid materials.

Number	Title	Date
--------	-------	------

- .6 Specifications included in bid materials.

Section	Title	Date	Pages
---------	-------	------	-------

- .7 Addenda issued by the Architect:

Number	Date	Pages
--------	------	-------

- .8 Other Exhibits:

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

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

The Sustainability Plan:

Title	Date	Pages
-------	------	-------

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

- .9 Other documents listed below:

(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

All documents required to be submitted with the Bid.

Additions and Deletions Report for AIA® Document A701™ – 2018

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:45:05 ET on 10/13/2021.

PAGE 1

Admin HVAC Phase II (Floors 1 and 2 and Basement) Project
Reading School District
800 Washington Street
Reading, PA 19601

...

THE ARCHITECT:ARCHITECT/ENGINEER (hereinafter and for purposes of this document and the contract documents, the "Architect"):

...

Consolidated Engineer
1022 James Drive
Leesport, PA 19533

PAGE 2

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

...

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

...

§ 3.1.1 Bidders shall obtain complete Bidding Documents, ~~as indicated below~~, Documents from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

PAGE 3

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

...

Via email to johns@cemec.com. No oral questions from Bidders will be reviewed or accepted. No questions shall be submitted directly to the Owner.

PAGE 4

Via email provided that an email address for the Bidder is known.

...

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid. Failure of any Bidder to receive such Addenda shall not relieve such Bidder from any obligation under its Bid as submitted.

...

Bids shall be accompanied with two complete original counterparts of each of the following documents, submitted using forms included in the Bidding Documents in the following order:

1. Bid Form;
 1. Bid Bond or other form of Bid Security specifically permitted herein;
 2. Agreement of Surety, including Power of Attorney;
 3. Non-Collusion Affidavit; and
 4. Statement of Bidder's Qualifications and Financial Disclosure.

...

By including a Non-Collusion Affidavit as an attachment to its bid, Bidder acknowledges the following:

...

.1 The Non-Collusion Affidavit is material to any contract awarded pursuant to this Bid. According to the Pennsylvania Anti-Bid-Rigging Act, 62 Pa. C.S.A § 4501, et seq., governmental agencies may require Non-Collusion Affidavits be submitted together with Bids.

...

.2 The Non-Collusion Affidavit must be executed by the member, officer or employee of the Bidder who makes the final decision on prices and the amount quoted in the Bid.

...

.3 Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of Bids are unlawful and may be subject to criminal prosecution. The person who signs the Non-Collusion Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the Bidder with responsibilities for the preparation, approval or submission of the Bid.

...

.4 In the case of a Bid submitted by a joint venture, each party to the venture must be identified on the Bid Form and a separate Non-Collusion Affidavit must be submitted separately on behalf of each party.

...

.5 The term "complementary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of Bids higher than the Bid of another firm, any intentionally high or non-competitive Bid, and any other form of Bid submitted for the purpose of giving a false appearance of competition.

...

.6 Failure to include an executed Non-Collusion Affidavit with its Bid in compliance with these instructions may result in disqualification of the Bid.

PAGE 5

Each Bid must be accompanied by certified check, bank check, cashier's check, treasurer's check or Bid Bond in the form included herein in the amount of ten percent (10%) of the total amount of the Bid drawn to the order of Reading School District. If the Bidder receiving a Notice of Intent to Award shall fail to execute the Contract, furnish the required Performance Bond and Payment Bond, Waiver of Liens/Mechanics' Lien Waiver, Verification Form required by the Pennsylvania Employment Verification Act ("Verification Form") and/or certificate of insurance evidencing the insurance coverages required by the General Conditions within seven (7) calendar days after receipt of the Notice of Intent to Award (a "Defaulting Bidder"), the Owner may apply the bid security toward the difference between the amount of the Bid of the Defaulting Bidder as accepted by the Owner and any higher amount for which the Owner may contract for the required Work, plus any advertising costs, legal fees, damages, penalties, and any and all other fees and expenses incurred by the Owner by reason of the failure of such Defaulting Bidder to comply herewith. If the amount of said damages exceeds the penal sum of the bid security, the Defaulting Bidder shall pay the Owner the full amount of the excess. If the Owner does not procure an executed contract with any other party for the performance of the Work within thirty (30) days after the acceptance of the Bid from the Defaulting Bidder, whether because of the lack of other Bids or the inability or refusal of any other Bidder to contract, or because the cost under any higher Bid would be greater than the Owner would afford, as determined in the sole discretion of the Owner, then in that event, the Defaulting Bidder and its Surety shall pay to the Owner the full amount of the bid security as liquidated damages and not as penalty.

PAGE 6

Bids are to be hand delivered or delivered by traceable means to the Reading School District Administration Building, Attention: Joe Chiarelli, Purchasing Manager, 800 Washington Street, Reading, Pennsylvania, 19601, by 11:00 a.m. on Monday, November 15, 2021. Bids received by US Postal Service, telephone facsimile machine (FAX) or email will NOT be accepted.

...

Negligence by Bidder in preparing its Bid confers no right of withdrawal or modification of its Bid after such Bid has been opened. No claims on account of mistakes or omissions in any Bid will be considered.

...

Notwithstanding the above, a Bidder may withdraw its Bid after such Bid has been opened in accordance with the causes set forth in the Pennsylvania Bid Withdrawal Act, Act No. 4 of 1974, 73 P.S. §1601 et seq. Strict compliance with said Bid Withdrawal Act is required to withdraw a Bid after the Bid Deadline.

...

~~§ 4.4.3 After-~~

...

~~the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where Bids shall be irrevocable for sixty (60) days after the actual day of opening thereof unless delayed by the required approval of another governmental agency, the sale of bonds or the award of a grant, in which case, Bids shall be irrevocable for one hundred twenty (120) days after the Bid Deadline. Extensions of the date for the award of contract may be made by the mutual written consent of Owner and the lowest responsible and responsive Bidder.~~

...

~~the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows: In the event the Prevailing Wage Rates included with the Bidding Document expire after the opening of Bids, but before the award of the Contract, the Bidder agrees that an updated determination of the Prevailing Wage Rates shall be obtained from the Secretary of Labor and Industry and that the Bidder, if awarded the Contract, will pay the Prevailing Wage Rates set forth in such updated determination in accordance with the requirements of the General Conditions, as amended. Under such circumstances, the Bidder agrees that it will not withdraw its Bid nor be entitled to~~

...

~~(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.) increase the amount Bid or the Contract Sum, as applicable.~~

PAGE 7

§ 5.2.1 Any Bid which contains omissions, additions or deductions not called for or permitted, alteration of forms, conditional or uninvited alternate proposals or irregularities of any kind may be rejected by the Owner, and any Bid which is not based upon the Bidding Documents and any Bid which, while otherwise regular in form, shall not be accompanied by proper Bid Security may be rejected by the Owner, in its sole and absolute discretion.

...

§ 5.2.2 The Bidder, in the completion of the Bid Form, shall insert Unit Prices where applicable. In the event any Unit Price, in the opinion of the Owner, is unreasonable or unbalanced, the Owner reserves the right to refuse or re-negotiate any or all such Unit Prices.

...

§ 5.2.3 The Bid of any Bidder or Bidders who engage in collusive bidding shall be rejected. Any Bidder who submits more than one Bid in such manner as to make it appear that the Bids submitted are on a competitive basis from different parties shall be considered a collusive Bidder. However, nothing in this section shall prevent a Bidder from submitting a subsequent Bid after withdrawing a prior Bid.

...

§ 5.2.4 The Owner may waive irregularities in a Bid, but is under no obligation to do so.

...

§ 5.2.5 The Owner shall have the right to reject any or all Bids for any reason whatsoever and to reject a Bid not accompanied by any information required by the Bidding Documents, to reject a Bid which is in any way incomplete, irregular or otherwise not responsive to the requirements of the Bidding Documents, or to reject the Bid of a Bidder who is not qualified in accordance with the requirements of the Bid. The Owner reserves the right to waive any informalities and technicalities in bidding and reserves the right to act in its own best interest. Without limiting the foregoing, the Owner shall have the right to reject a Bid if the Bidder has failed to comply with all applicable standards, codes, laws, ordinances, regulations and/or requirements of any state, federal or other agency on any previous project.

...

§ 5.2.6 If for any reason whatsoever, the Owner rejects Bidder's Bid, Bidder agrees that it will not seek to recover profits on Work not performed nor will it seek to recover its Bid preparation costs.

...

§ 5.3.3 In the event of a dispute between a Bidder and the Owner regarding the Owner's determination of which Bidder is the lowest responsive, responsible Bidder, such contesting Bidder shall be responsible for any legal fees (e.g., fees of attorneys, paralegals and other legal professionals), professional fees, or other costs or expenses incurred by the Owner to the extent the Bidder does not completely prevail in such contest. Furthermore, under no circumstances shall the Owner be responsible for any legal fees, professional fees, or other costs or expenses incurred by the contesting Bidder if the Owner decides not to award the Contract to such Bidder based upon the Owner's determination in its sole and absolute discretion that such contesting Bidder is not the lowest responsive, responsible Bidder.

PAGE 8

§ 5.3.4 If the Owner elects to proceed with the Project, the Owner, either through the Architect or its legal counsel, will issue a Notice of Intent to Award to the lowest, responsible Bidder. Issuance of the Notice of Intent to Award shall not be construed as a binding contract or offer by the Owner and may include conditions precedent to the issuance of the Award of the Contract if deemed prudent by the Owner.

...

§ 5.3.5 The Work to be performed for this Project is public work and may be financed by the Owner (a public body) by issuance of certain bonds, the issuance of which may be subject to various qualifications and restrictions. The Owner, in good faith, intends to consummate any necessary financing, but its ability to do so is subject to many factors beyond its control. It is therefore expressly understood and agreed to by each Bidder that, notwithstanding any other provision of the Contract Documents, the Owner may cancel any award made by it or cancel any Contract entered into with any Bidder without liability to the Bidder, at any time before the Bidder has been given a written Notice to Proceed and has actually begun Work under the Contract, if financing satisfactory to the Owner cannot reasonably be consummated as contemplated or if any court of competent jurisdiction shall enjoin or otherwise prohibit the Owner from proceeding with the Work.

...

§ 6.2 Owner's Financial Capability

...

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

...

.4 A separate and complete Verification Form required by the Public Works Employment Verification Act, 43 P.S. § 167.1, et seq., for itself acknowledging its responsibilities and its compliance with the Public Works Employment Verification Act as a precondition of the Owner's Award of the Contract. The Verification Form shall be obtained from the Secretary of the Pennsylvania Department of General Services and shall include a certification that the information is true and correct, subject to sanctions provided by law. The respective Verification Form shall be executed by a representative who has sufficient knowledge and authority to make the representations and certifications contained in the Verification Form.

...

.5 A fully executed Performance Bond on the form included in the Bidding Documents

...

.6 A fully executed Payment Bond on the form included in the Bidding Documents

...

.7 A fully executed Waiver of Liens/Mechanics' Lien Waiver on the form included in this Project Manual.

...

.8 The duly executed Contract, as prepared by Owner based on the amount Bid.

...

.9 A Certificate of Insurance evidencing the insurance coverages and endorsements required to be maintained by the Contractor pursuant to Article 11 of the General Conditions.

PAGE 9

~~§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds. The Bidder shall furnish a performance bond and payment bond, each with a penal sum equal to 100% of the Contract Sum, covering the faithful performance of the Contract and payment of all obligations arising thereunder, thereunder within seven (7) days of the Notice of Intent to Award the Contract.~~

...

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

...

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

...

~~§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. The surety bonds required shall have as surety thereon a corporation duly authorized to conduct business in Pennsylvania and which is in accordance with the Contract Documents.~~

...

- ~~2 AIA Document A101™ 2017, Exhibit A, Insurance and Bonds, unless otherwise stated below. Insurance and Bonds as required in bid materials.~~

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- ~~3 AIA Document A201™-2017, General Conditions of the Contract for Construction, as amended, unless otherwise stated below.~~

...

- ~~4 AIA Document E203™ 2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:~~

...

~~(Insert the date of the E203-2013.)~~

...

- ~~.5 Drawings included in bid materials.~~

...

- ~~.6 Specifications included in bid materials.~~

...

- ~~.7 Addenda: Addenda issued by the Architect:~~

...

All documents required to be submitted with the Bid.

Certification of Document's Authenticity

AIA® Document D401™ - 2003

I, Alicia S. Luke, Esquire, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:45:05 ET on 10/13/2021 under Order No. 2114247276 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ - 2018, Instructions to Bidders, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 004313 BID BOND FORM

KNOW ALL MEN BY THESE PRESENTS that we, _____
(hereinafter called the “Principal”), and _____
a company authorized to transact business in the Commonwealth of Pennsylvania, and having its principal
office at _____
(hereinafter called the “Surety”), as Surety, are held and firmly bound unto the Reading School District
(hereinafter called the “Obligee”), as Obligee, in the amount equal to TEN PERCENT (10%) OF THE BASE
BID PLUS ANY ADDITIVE ALTERNATES (the “Penal Sum”), as lawful money of the United States of
America, for payment of which we bind ourselves, and each of our respective heirs, legal representatives,
successors and assigns, jointly and severally, by these presents, on this _____ day of _____, 2021.

WHEREAS, said Principal is herewith submitting to the Obligee a Bid to perform the Work pursuant to
Contract No. 1: General Construction, Contract No. 2: HVAC Construction, Contract No 3: Electrical
Construction or Contract No. 4 Plumbing Construction for the Obligee to complete the First and Second Floors
HVAC and Electrical Upgrades at the Reading School District Administration Building Project pursuant to the Bidding
Documents thereof which include, without limitation, the Project Manual Table of Contents, Invitation to Bid,
Instructions to Bidders, General Conditions of Contract, Bid Bond Form, Contract Form, Performance Bond
Form, Payment Bond Form, Maintenance Bond Form, Non-Collusion Affidavit Form, Specifications, Bid
Form, and any Addenda; and it is a condition of the Obligee’s receipt and consideration of said Bid that such
shall be accompanied by Bid Security to be held by the Obligee on terms embodied herein.

THEREFORE, the condition of this obligation is that if said Principal shall furnish to the Obligee together
with good and sufficient surety or sureties, as may be required for the faithful performance and proper
fulfillment of the Contract, in the form specified by the Owner, and, within seven (7) days of receiving a Notice
of Intent to Award, three complete, executed counterparts of (1) Executed Agreement Form, (2) Completed
and executed Performance Bond, (3) Completed and executed Payment Bond, (4) Executed Waiver of
Liens/Mechanic’s Lien Waiver, (5) Certificate of Insurance evidencing insurance coverage required by the
General Conditions, and (6) Executed Verification Form required by the Public Works Employment
Verification Act (the “Post-Bid Submittals”) then this obligation shall be void and of no effect, but otherwise
it shall remain in full force. If the Principal shall fail to furnish three complete, executed counterparts of all
Post-Bid Submittals to Obligee within seven (7) calendar days after receipt of the Notice of Intent to Award (a
“Bid Default”), the Obligee may apply the Penal Sum toward the difference between the amount of the Bid of
the Principal as accepted by the Obligee and any higher amount for which the Obligee may contract for the
required Work, plus any advertising costs, legal fees, damages, penalties, and any and all other fees and expenses
incurred by the Obligee by reason of the failure of the Principal to comply herewith. If the Obligee does not
procure an executed contract with any other party for the performance of the Work within thirty (30) days after
the acceptance of the Bid from the Principal, whether because of the lack of other Bids or the inability or refusal
of any other Bidder to contract, or because the cost under any higher Bid would be greater than the Obligee
would afford, as determined in the sole discretion of the Obligee, then in that event, the Surety shall pay to the
Obligee the full amount of the Penal Sum as liquidated damages and not as penalty.

THE SURETY, ITS HEIRS, EXECUTORS, ADMINISTRATORS, SUCCESSORS AND ASSIGNS, FIRMLY BY THESE PRESENTS, AUTHORIZE AND EMPOWER ANY ATTORNEY OF ANY COURT OF RECORD TO APPEAR FOR IT AND EACH OF ITS HEIRS, EXECUTORS, ADMINISTRATORS, SUCCESSORS AND ASSIGNS, AND CONFESS JUDGMENT IN FAVOR OF THE OBLIGEE, ITS SUCCESSORS AND ASSIGNS, AND AGAINST THE SURETY AND EACH OF ITS HEIRS, EXECUTORS, ADMINISTRATORS, SUCCESSORS AND ASSIGNS, TOGETHER WITH AN ATTORNEY'S COMMISSION OF TWENTY PERCENT (20%) OF THE AMOUNT CONFESSED, BESIDES COST OF SUIT, WITH RELEASE OF ERRORS AND WAIVE OF ALL CAUSES FOR STAY OF EXECUTION AND EXEMPTION. THE SURETY FURTHER AGREES THAT IF, IN THE OPINION OF THE OBLIGEE, ANY BID DEFAULT SHALL HAPPEN ON THE PART OF THE PRINCIPAL, THE SURETY SHALL PAY ALL LOSS OCCASIONED THEREBY, AND THAT THE ASCERTAINED AMOUNT THEREOF, WHICH SHALL BE DETERMINED BY THE OBLIGEE, AND OF THE TRUTH OF WHICH OATH OR AFFIRMATION SHALL BE MADE BY THE OBLIGEE SHALL BE FINAL, BINDING AND CONCLUSIVE UPON THE SURETY, AND THAT EXECUTION FORTHWITH SHALL ISSUE AGAINST THE SURETY THE AMOUNT OF SAID BID DEFAULT.

[Signatures on the following page]

**First and Second Floor HVAC and Electrical Upgrades
Reading School District Administration Building
October 2021**

IN WITNESS WHEREOF, the Principal and Surety, intending to be legally bound, have executed this Bid Bond the day and year aforementioned.

Individual Principal Witness: _____	By: _____ Name: _____ Trading and/or Doing Business as: _____
---	--

Partnership Principal Name of Partnership: _____ Witness: _____	By: _____ Name: _____ Title: _____ By: _____ Name: _____ Title: _____
--	--

Corporate or Limited Liability Company Principal Name of Entity: _____ Attest: _____	By: _____ Name: _____ Title: _____*
---	---

[CORPORATE SEAL]

* If the signatory is an authorized representative, attach proof evidencing authority to execute on behalf of the corporation or limited liability company

Corporate Surety Name of Surety: _____ Witness or Attest: _____	By: _____ Name: _____ Title: _____**
--	--

[CORPORATE SEAL]

Attach an appropriate Power of Attorney evidencing the authority of the Attorney-in-Fact to act on behalf of the Surety.

CERTIFICATE AS TO CORPORATE OR LIMITED LIABILITY PRINCIPAL

I, _____, certify that I am the Corporate Secretary of the corporation or limited liability company named as PRINCIPAL, in the within Bid Bond; that _____, who signed the said Bid Bond on behalf of the Principal, was then _____ of said corporation or limited liability company; that I know the signee's signature, and the signature thereto is genuine; and that said Bid Bond is duly signed, sealed and attested for on behalf of said corporation or limited liability company by authority of its governing body.

Signature: _____

Name: _____

Title: Secretary

Date: _____

(SEAL)

END OF SECTION 004313

SECTION 004314 AGREEMENT OF SURETY

KNOW ALL MEN BY THESE PRESENTS, that we

_____,
as Surety, a corporation existing under the laws of the State of _____, and
authorized to transact business in the Commonwealth of Pennsylvania, hereby agree to execute within the time
limit specified in the Contract Documents, the Contract Bonds in the forms and in the amounts required for
the faithful performance and proper fulfillment of Contract No. 1: General Construction, Contract No. 2:
HVAC Construction, Contract No. 3 Electrical Construction or Contract No. 4 Plumbing Construction for
the Obligee to complete the First and Second Floors HVAC and Electrical Upgrades at the Reading School District
Administration Building on behalf of:

[Name of Contractor] (“Principal “)

hereinafter called the Bidder, provided that the above Contract be awarded to the Bidder as provided in the
Instructions to Bidders, and the Surety further agrees that should the Surety, after notification of intent to make
such award, omit or refuse to execute the required bonds, then the Surety shall pay to the Obligee the difference
between the amount of the Principal’s accepted Bid and any higher amount for which the Obligee may contract
for the required work, as well as any advertising, Architect’s, engineering, legal and other expenses incurred by
the Obligee by reason of the default; provided, however, that the obligations of the Surety hereunder shall not
exceed the amount of Bid Security provided by the Bidder together with interest.

WITNESS

CORPORATE SURETY

DATE

SIGNATURE (SEAL)

ATTORNEY-IN-FACT

END OF SECTION 004314

SECTION 00 52 00 - OWNER AND CONTRACTOR AGREEMENT FORM

See attached AIA A101-2017, as modified by Owner

Contract No. 1: General Construction
Contract No. 2: HVAC Construction
Contract No. 3: Electrical Construction
Contract No. 4: Plumbing Construction



AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year 2021
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

Reading School District
800 Washington Street
Reading, PA 19601
Telephone Number: (484) 258-7031
Fax Number: (610) 371-5971

and the Contractor:
(Name, legal status, address and other information)

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

Admin HVAC Phase II (Floors 1 and 2 and Basement) Project

The Architect/Engineer (hereinafter and for purposes of this Agreement and the contract documents, the "Architect"):
(Name, legal status, address and other information)

Consolidated Engineers
1022 James Drive
Leesport, PA 19533

The Owner and Contractor agree as follows.

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

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

The parties should complete A101®-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9. For the purpose of this Agreement, the term General Conditions as used herein shall mean the General Conditions of the Contract for Construction as modified by the Owner.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

The date of this Agreement.

A date set forth in a notice to proceed issued by the Owner.

Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

Approximately January 4, 2022

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

Init.

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

Not later than () calendar days from the date of commencement of the Work.

By the following date: October 31, 2022

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

If the Contractor is responsible, in the opinion of the Owner's Project Representative or Architect, for delay in the actual time of completion of any other Contractor employed by the Owner in performance of any other portion of the Project, then the Contractor shall be liable for and shall pay to the Owner all liquidated damages otherwise attributable to such other contractor, as well as any legal fees, professional fees, or other costs or expenses incurred by the Owner.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
------	-------	---------------------------

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price
------	-------

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

Init.

The Contractor and Contractor's Surety shall be jointly and severally liable for and shall pay the Owner the cost of expenses incurred by the Owner resulting from the Contractor's delay in completing the Work of the Contract within the Contract Time, as liquidated damages, and not as a penalty, in the amount of Five Hundred Dollars (\$500.00) per calendar day that has not achieved Substantial Completion or Final Completion, for each calendar day of delay until the Work is substantially complete, subject to adjustments of the Contract Time as provided in the Contract Documents.

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

No quantity limitations shall apply to the Project. The allowances shall be solely owned by the Owner and, as such, the Owner shall have the sole discretion relating to the use of these allowances. Furthermore, any unused portion of the allowances shall be deducted from the Contractor's Contract Sum. The Contractor shall receive no compensation on the unused portion of the allowances. The Contractor will be required to furnish documentation to the Owner evidencing the expenditures charged to the allowances and the reasons therefor prior to the Owner's approval of expenditures from the allowances.

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

Except as set forth elsewhere in the Contract Documents, payments to the Contractor will be made monthly for work completed as of the fifteenth calendar day of the month provided that all requirements of the Contract Documents have been and are complied with by the Contractor.

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 20th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the last day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than sixty (60) days after the Architect receives the Application for Payment. The Contractor hereby waives any rights that the Contractor has or may have under the Pennsylvania Prompt Pay Act, 62 Pa.C.S.A. Section 3931, et seq. as amended from time to time.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™-2017, General Conditions of the Contract for Construction, as amended, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less the retainage. Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included

Init.

- as provided in the AIA Document A201-2017, General Conditions of the Contract for Construction, as amended;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing, less the retainage;
 - .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201-2017, as amended;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201-2017, as amended; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

The retainage withheld by the Owner from the Contractor shall be ten percent (10%) of the amount due the Contractor until fifty percent (50%) of the Work is completed.

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

Except as otherwise provided herein, when the Project is fifty percent (50%) complete, the amount retained by the Owner shall be reduced to five percent (5%) of the amount due the Contractor, provided that the Architect approves the Application for Payment, the Contractor is making satisfactory progress and there is no specific cause for greater withholding. Notwithstanding the foregoing, the Owner may continue to withhold ten percent (10%) of the amount due the Contractor after fifty percent (50%) of the Work is completed if the Architect provides written notification to the Owner of a specific cause for greater withholding or if the Owner determines in its sole and absolute discretion that there is a specific cause for greater withholding. A specific cause for greater withholding shall include, without limitation, the following:

- .1 The Contractor's inability to produce evidence satisfactory to the Owner evidencing payments for materials, labor and/or payments to Subcontractors, manufacturers or suppliers;
- .2 The existence of a dispute between the Owner and the Contractor regarding increased costs claimed by such Contractor; or
- .3 The Contractor's failure to complete the Work in accordance with the Contractor Documents, including, without limitation, the Drawings and Specifications, etc.

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

Upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims.

In addition to the Owner's right to determine if a specific cause for greater withholding exists, the Architect shall be entitled to determine if a specific cause for greater withholding exists. The Architect shall reject the reduction in retainage if the Contractor is not making satisfactory progress in its Work, or if the Architect determines that there is a specific cause for greater withholding. The Architect will consider the following items when reviewing a request for reduction in retainage and failure to meet any of the following requirements may be considered by the Architect as sufficient grounds for rejecting a reduction of retainage:

- .1 Satisfactory performance of the Work.
- .2 Satisfactory maintenance of the Project schedule.
- .3 Proper manning of the Project.
- .4 Satisfactory completion of the Work.
- .5 Satisfactory organization of the Project.
- .6 Proper organization and coordination of subcontractors.
- .7 Proper coordination of the Work.
- .8 All defective Work has been remedied or is in the process of being remedied.
- .9 Work completed is not in contention.
- .10 Satisfactory follow through of paperwork, certified payrolls, Change Order proposals, or Construction Change Directives.

The Architect's decision to reject a reduction of retainage shall be final and binding on the Contractor.

If a specific cause for greater withholding does not exist, sum or sums withheld by the Owner from the Contractor after the Work is fifty percent (50%) completed shall not exceed five percent (5%) of the value of completed Work based on monthly progress payment requests.

In the event a dispute arises between the Owner and Contractor, the Owner shall have the option as it deems necessary, in its sole and absolute discretion, to either continue to withhold ten percent (10%) of the total amount due the Contractor or to withhold additional retainage over and above the amount already retained by the Owner in the sum of one hundred fifty percent (150%) of the amount of any possible liability until such time as a final resolution is agreed to by all parties directly or indirectly involved, unless Contractor furnishes a bond satisfactory to the Owner to indemnify the Owner against the claim.

Upon the Architect's issuance of the Certificate of Substantial Completion, the retainage shall be equal to fifty percent (50%) of the cost to complete any then remaining, uncompleted, minor items.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201-2017, as amended, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 a final Certificate for Payment has been issued by the Architect;

Init.

- .3 the Contractor has completed all Work in compliance with all applicable codes, laws, ordinances and regulations, which affect the Project and Work has passed all inspections.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the Contractor has satisfactorily completed all items identified in the punchlist prepared at Substantial Completion and the issuance of the Architect's final Certificate for Payment

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

3 % per annum

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201-2017, as amended, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(Paragraph Deleted)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201-2017, as amended, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

Arbitration pursuant to Section 15.4 of AIA Document A201-2017

Litigation exclusively and only in the Court of Common Pleas of Berks County, Pennsylvania, and shall not be subject to arbitration, except for compulsory arbitration as provided by the applicable Rules of Civil Procedure. Both parties hereby irrevocably submit to the personal jurisdiction and venue of the Court of Common Pleas of Berks County and agree that the Contractor shall pay any attorneys' fees incurred by the Owner to transfer a claim filed elsewhere.

Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201-2017, as amended.

Init.

(Paragraphs Deleted)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017, as amended.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017, as amended, or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

Dennis Campbell, Facilities /Construction
717 Tulpehocken Street
Reading, PA 19601
Telephone: (610) 921-4900
Email: campbelld@readingsd.org

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in the project bid documents/project manual, including, but not limited to, the A201-2017, as amended and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in the project bid documents/project manual and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, as amended, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

Init.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A701™-2017, Instructions to Bidders
- .3 AIA Document A201™-2017, General Conditions of the Contract for Construction, as amended

(Paragraph Deleted)

.5 Drawings included in bid materials.

Number	Title	Date
--------	-------	------

.6 Specifications included in bid materials.

Section	Title	Date	Pages
---------	-------	------	-------

.7 Addenda issued by the Architect, if any:

Number	Date	Pages
--------	------	-------

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

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

(Paragraphs Deleted)

(Paragraph Deleted)

(Table Deleted)

(Paragraph Deleted)

(Table Deleted)

Init.

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

The Bidding Documents, as defined in the Instructions to Bidders issued in the Project Manual associated with this Project, including the Instructions to Bidders. All documents submitted by Contractor in connection with its Bid.

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*

CONTRACTOR *(Signature)*

(Printed name and title)

(Printed name and title)

Additions and Deletions Report for **AIA® Document A101® – 2017**

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 14:53:28 ET on 10/13/2021.

PAGE 1

AGREEMENT made as of the day of in the year 2021

...

Reading School District
800 Washington Street
Reading, PA 19601
Telephone Number: (484) 258-7031
Fax Number: (610) 371-5971

...

Admin HVAC Phase II (Floors 1 and 2 and Basement) Project

...

The ~~Architect~~ Architect/Engineer (hereinafter and for purposes of this Agreement and the contract documents, the "Architect"):

...

Consolidated Engineers
1022 James Drive
Leesport, PA 19533

PAGE 2

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9. For the purpose of this Agreement, the term General Conditions as used herein shall mean the General Conditions of the Contract for Construction as modified by the Owner.

...

[] Established as follows:

...

Approximately January 4, 2022

PAGE 3

[] By the following date: October 31, 2022

...

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

...

If the Contractor is responsible, in the opinion of the Owner's Project Representative or Architect, for delay in the actual time of completion of any other Contractor employed by the Owner in performance of any other portion of the Project, then the Contractor shall be liable for and shall pay to the Owner all liquidated damages otherwise attributable to such other contractor, as well as any legal fees, professional fees, or other costs or expenses incurred by the Owner.

PAGE 4

The Contractor and Contractor's Surety shall be jointly and severally liable for and shall pay the Owner the cost of expenses incurred by the Owner resulting from the Contractor's delay in completing the Work of the Contract within the Contract Time, as liquidated damages, and not as a penalty, in the amount of Five Hundred Dollars (\$500.00) per calendar day that has not achieved Substantial Completion or Final Completion, for each calendar day of delay until the Work is substantially complete, subject to adjustments of the Contract Time as provided in the Contract Documents.

...

No quantity limitations shall apply to the Project. The allowances shall be solely owned by the Owner and, as such, the Owner shall have the sole discretion relating to the use of these allowances. Furthermore, any unused portion of the allowances shall be deducted from the Contractor's Contract Sum. The Contractor shall receive no compensation on the unused portion of the allowances. The Contractor will be required to furnish documentation to the Owner evidencing the expenditures charged to the allowances and the reasons therefor prior to the Owner's approval of expenditures from the allowances.

...

Except as set forth elsewhere in the Contract Documents, payments to the Contractor will be made monthly for work completed as of the fifteenth calendar day of the month provided that all requirements of the Contract Documents have been and are complied with by the Contractor.

...

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 20th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the last day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than sixty (60) days after the Architect receives the Application for Payment. The Contractor hereby waives any rights that the Contractor has or may have under the Pennsylvania Prompt Pay Act, 62 Pa.C.S.A. Section 3931, et seq. as amended from time to time.

...

§ 5.1.6 In accordance with AIA Document A201™-2017, General Conditions of the Contract for Construction, as amended, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

PAGE 5

.1 ~~That~~ Take that portion of the Contract Sum properly allocable to completed Work; Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less the retainage. Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in the AIA Document A201-2017, General Conditions of the Contract for Construction, as amended;

...

.2 ~~That~~ Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in ~~writing; and~~ writing, less the retainage;

...

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document ~~A201-2017;~~ A201-2017, as amended;

...

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document ~~A201-2017;~~ A201-2017, as amended; and

...

The retainage withheld by the Owner from the Contractor shall be ten percent (10%) of the amount due the Contractor until fifty percent (50%) of the Work is completed.

...

Except as otherwise provided herein, when the Project is fifty percent (50%) complete, the amount retained by the Owner shall be reduced to five percent (5%) of the amount due the Contractor, provided that the Architect approves the Application for Payment, the Contractor is making satisfactory progress and there is no specific cause for greater withholding. Notwithstanding the foregoing, the Owner may continue to withhold ten percent (10%) of the amount due the Contractor after fifty percent (50%) of the Work is completed if the Architect provides written notification to the Owner of a specific cause for greater withholding or if the Owner determines in its sole and absolute discretion that there is a specific cause for greater withholding. A specific cause for greater withholding shall include, without limitation, the following:

...

.1 The Contractor's inability to produce evidence satisfactory to the Owner evidencing payments for materials, labor and/or payments to Subcontractors, manufacturers or suppliers;

...

.2 The existence of a dispute between the Owner and the Contractor regarding increased costs claimed by such Contractor; or

...

.3 The Contractor's failure to complete the Work in accordance with the Contractor Documents, including, without limitation, the Drawings and Specifications, etc.

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Upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims.

...

In addition to the Owner's right to determine if a specific cause for greater withholding exists, the Architect shall be entitled to determine if a specific cause for greater withholding exists. The Architect shall reject the reduction in retainage if the Contractor is not making satisfactory progress in its Work, or if the Architect determines that there is a specific cause for greater withholding. The Architect will consider the following items when reviewing a request for reduction in retainage and failure to meet any of the following requirements may be considered by the Architect as sufficient grounds for rejecting a reduction of retainage:

...

.1 Satisfactory performance of the Work.

...

.2 Satisfactory maintenance of the Project schedule.

...

.3 Proper manning of the Project.

...

~~§ 5.1.8 If final completion of the~~ .4 Satisfactory completion of the Work.

...

.5 Satisfactory organization of the Project.

...

.6 Proper organization and coordination of subcontractors.

...

.7 Proper coordination of the Work.

...

.8 All defective Work is materially delayed-has been remedied or is in the process of being remedied.

...

9 Work completed is not in contention.

...

~~through no fault~~ 10 Satisfactory follow through of paperwork, certified payrolls, Change Order proposals, or Construction Change Directives.

...

The Architect's decision to reject a reduction of retainage shall be final and binding on the Contractor.

...

If a specific cause for greater withholding does not exist, sum or sums withheld by the Owner from the Contractor after the Work is fifty percent (50%) completed shall not exceed five percent (5%) of the value of completed Work based on monthly progress payment requests.

...

~~Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9~~ In the event a dispute arises between the Owner and Contractor, the Owner shall have the option as it deems necessary, in its sole and absolute discretion, to either continue to withhold ten percent (10%) of the total amount due the Contractor or to withhold additional retainage over and above the amount already retained by the Owner in the sum of one hundred fifty percent (150%) of the amount of any possible liability until such time as a final resolution is agreed to by all parties directly or indirectly involved, unless Contractor furnishes a bond satisfactory to the Owner to indemnify the Owner against the claim.

...

~~of AIA Document A201-2017.~~ Upon the Architect's issuance of the Certificate of Substantial Completion, the retainage shall be equal to fifty percent (50%) of the cost to complete any then remaining, uncompleted, minor items.

...

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201-2017, as amended, and to satisfy other requirements, if any, which extend beyond final payment; and

...

.2 a final Certificate for Payment has been issued by the Architect.

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.3 the Contractor has completed all Work in compliance with all applicable codes, laws, ordinances and regulations, which affect the Project and Work has passed all inspections.

...

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the Contractor has satisfactorily completed all items identified in the punchlist prepared at Substantial Completion and the issuance of the Architect's final Certificate for Payment, or as follows: Payment

...

3 % per annum

...

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201-2017, as amended, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

...

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

...

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201-2017, as amended, the method of binding dispute resolution shall be as follows:

...

[~~]—Litigation in a court of competent jurisdiction X] Litigation exclusively and only in the Court of Common Pleas of Berks County, Pennsylvania, and shall not be subject to arbitration, except for compulsory arbitration as provided by the applicable Rules of Civil Procedure. Both parties hereby irrevocably submit to the personal jurisdiction and venue of the Court of Common Pleas of Berks County and agree that the Contractor shall pay any attorneys' fees incurred by the Owner to transfer a claim filed elsewhere.~~

...

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document ~~A201-2017~~-A201-2017, as amended.

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§ 7.1.1 ~~If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201-2017, then the Owner shall pay the Contractor a termination fee as follows:~~

...

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

...

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document ~~A201-2017~~-A201-2017, as amended.

...

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document ~~A201-2017~~ A201-2017, as amended, or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

...

Dennis Campbell, Facilities /Construction
717 Tulpehocken Street
Reading, PA 19601
Telephone: (610) 921-4900
Email: campbelld@readingsd.org

...

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in ~~AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds,~~ the project bid documents/project manual, including, but not limited to, the A201-2017, as amended and elsewhere in the Contract Documents.

...

§ 8.5.2 The Contractor shall provide bonds as set forth in ~~AIA Document A101™-2017 Exhibit A,~~ the project bid documents/project manual and elsewhere in the Contract Documents.

...

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201-2017, as amended, may be given in accordance with AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

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~~.2 AIA Document A101™-2017, Exhibit A, Insurance and Bonds~~ A701™-2017, Instructions to Bidders

...

~~.3 AIA Document A201™-2017, General Conditions of the Contract for Construction~~

...

~~.4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:~~ Construction, as amended

...

(Insert the date of the E203-2013 incorporated into this Agreement.)

...

~~.5 Drawings included in bid materials.~~

...

.6 Specifications included in bid materials.

...

.7 ~~Addenda~~, Addenda issued by the Architect, if any:

...

~~[] AIA Document E204™ 2017, Sustainable Projects Exhibit, dated as indicated below:~~

...

~~(Insert the date of the E204 2017 incorporated into this Agreement.)~~

...

~~[] The Sustainability Plan:~~

...

Title	Date	Pages
-------	------	-------

...

~~[] Supplementary and other Conditions of the Contract:~~

...

Document	Title	Date	Pages
----------	-------	------	-------

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The Bidding Documents, as defined in the Instructions to Bidders issued in the Project Manual associated with this Project, including the Instructions to Bidders. All documents submitted by Contractor in connection with its Bid.

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Alicia S. Luke, Esquire, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 14:53:28 ET on 10/13/2021 under Order No. 2114247276 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ - 2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)

SECTION 006113 PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that we, _____,
as Principal (the "Principal"), and _____, a
company organized and existing under the laws of the _____ of _____, having its
principal office at _____, and
authorized to do business in the Commonwealth of Pennsylvania, as Surety (the "Surety"), are held and firmly
bound, jointly and severally, unto the READING SCHOOL DISTRICT, as Obligee (the "Obligee"), as hereinafter
set forth in the full and just sum of _____ Dollars
(\$ _____), lawful money of the United States of America, for the payment of which sum we
bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these
presents.

WITNESSETH THAT:

WHEREAS, the Principal heretofore has submitted to the Obligee a certain Bid, dated
_____, 2021 (the "Bid"), to perform General Construction, HVAC Construction, Electrical
Construction, or Plumbing Construction Work for the Obligee, in connection with the First and Second Floors
HVAC and Electrical Upgrades at the Reading School District Administration Building pursuant to Drawings,
Specifications and other related documents constituting the Bidding Documents, which are incorporated into the
Bid by reference (the "Contract Documents"), as prepared by Consolidated Engineers and

WHEREAS, the Obligee is a "Contracting Body" under provisions of Act No. 385 of the General
Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known and
cited as the "Public Works Contractors' Bond Law of 1967" (the "Act"); and

WHEREAS, the Act, in Section 3(a), requires that, before an award shall be made to the Principal by the
Obligee in accordance with the Bid, the Principal shall furnish this Performance Bond to the Obligee, with this
Performance Bond to become binding upon the Award of the Contract to the Principal by the Obligee in
accordance with the Bid; and

WHEREAS, it also is a condition of the Contract Documents that this Performance Bond shall be
furnished by the Principal to the Obligee; and

WHEREAS, under the Contract Documents, it is provided, inter alia, that if the Principal shall furnish this
Performance Bond and the Payment Bond to the Obligee, and if the Obligee shall make an award to the Principal
in accordance with the Bid, then the Principal and the Obligee shall enter into an agreement with respect to
performance of such Work (the "Agreement"), the form of which Agreement is set forth in the Contract
Documents.

NOW, THEREFORE, the terms and conditions of this Performance Bond are and shall be that if: (a) the
Principal well, truly and faithfully shall comply with and shall perform the Work in accordance with the Contract
Documents, at the time and in the manner provided in the Contract Documents, and if the Principal shall satisfy
all claims and demands incurred in or related to the performance of the Contract Documents by the Principal or
growing out of the performance of the Contract Documents by the Principal, and if the Principal shall indemnify
completely and shall save harmless the Obligee and all of its officers, agents and employees from any and all costs
and damages, including, but not limited to, liquidated damages which the Obligee and all of its officers, agents and
employees may sustain or suffer by reason of the failure of the Principal to do so, and if the Principal shall reimburse
completely and shall pay to the Obligee any and all costs and expenses which the Obligee and all of its officers,
agents and employees may incur by reason of any such default or failure of the Principal, including, but not limited
to, legal fees (e.g., fees of attorneys, paralegals and other legal professionals) and professional fees resulting from

such default or failure of the Principal, consequential, incidental, and delay damages resulting from such default or failure of the Principal and liquidated damages in accordance with the Contract Documents, and (b) if the Principal shall remedy, without cost to the Obligee, all defects which may develop during the period of one (1) year from the date of final completion by the Principal and acceptance of the Obligee of the Work to be performed under the Contract Documents, which defects, in the sole judgment of the Obligee or its legal successors in interest, shall be caused by or shall result from defective or inferior materials or workmanship, then this Performance Bond shall be void; otherwise, this Performance Bond shall be and shall remain in force and effect and all claims, demands, costs, expenses and damages, including, but not limited to, legal fees and professional fees resulting from the default or failure of Principal, consequential, incidental, and delay damages resulting from such default or failure of the Principal, and liquidated damages in accordance with the Contract Documents, shall be payable by Principal and Surety upon demand of Obligee; provided, however, that the obligations of the Surety hereunder shall not exceed the amount of this Performance Bond, as this Performance Bond is amended, whether automatically or in writing, in accordance with the terms hereof.

This Performance Bond is executed and delivered under and subject to the Act, to which reference hereby is made.

The Principal and the Surety agree that any alterations, changes and/or additions to the Contract Documents, and/or any alterations, changes and/or additions to the Work to be performed under the Contract Documents, and/or any giving by the Obligee of any extensions of time for the performance of the Work in accordance with the Contract Documents, and/or any act of forbearance of either the Principal or the Obligee toward the other with respect to the Contract Documents, and/or the reduction of any percentage to be retained by the Obligee as permitted by the Contract Documents, shall not release, and/or discharge, in any manner whatsoever, the Principal and the Surety, or either of them, or their heirs, executors, administrators, successors and assigns, from liability and obligations under this Performance Bond; and the Surety, for value received, does waive notice of any such alterations, changes, additions, extensions of time, acts of forbearance, and/or reduction of retained percentage.

Provided, that it is expressly agreed that this Performance Bond shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon any amendment to the Contract Documents not increasing the Contract Sum in the aggregate by more than twenty percent (20%), so as to bind the Principal and the Surety to the full and faithful performance of the Contract Documents as so amended and the Surety, for value received, does waive notice of any such amendment to the Contract Documents not increasing the Contract Sum in the aggregate by more than twenty percent (20%). The term "Amendment", wherever used in this Performance Bond and whether referring to this Performance Bond, or the Contract Documents, shall include, without limitation, any alteration, addition, extension or modification, and of any character whatsoever.

Provided, further, that no final settlement between the Obligee and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

In the event that the Obligee incurs legal fees for default or enforcement of its rights under the Contract Documents or Performance Bond, the Surety agrees to pay for all reasonable legal fees and costs incurred by the Obligee.

Any dispute resolution proceeding, legal or equitable, under this Performance Bond, shall be instituted in the Court of Common Pleas of Berks County or in the United States District Court for the Eastern District of Pennsylvania and not elsewhere. In such dispute resolution proceeding, Obligee may join both Principal and Surety as parties, and Principal and Surety hereby consent to such joinder, jurisdiction and venue. This Performance Bond shall be governed by, construed and enforced in accordance with the laws of the Commonwealth of Pennsylvania, without regard to principles of conflicts of law.

[Signatures on the following page]

**First and Second Floor HVAC and Electrical Upgrades
Reading School District Administration Building
October 2021**

IN WITNESS WHEREOF, the Principal and the Surety cause this Performance Bond to be signed, sealed and delivered this _____ day of _____, 2021.

Individual Principal Witness: _____	By: _____ Name: _____ Trading and/or Doing Business as: _____
---	--

Partnership Principal Name of Partnership: _____ Witness: _____	By: _____ Name: _____ Title: _____ By: _____ Name: _____ Title: _____
--	--

Corporate or Limited Liability Company Principal Name of Entity: _____ Attest: _____	By: _____ Name: _____ Title: _____*
---	---

[SEAL]

* If the signatory is an authorized representative, attach proof evidencing authority to execute on behalf of the corporation or limited liability company

Corporate Surety Name of Surety: _____ Witness or Attest: _____	By: _____ Name: _____ Title: _____**
--	--

[SEAL]

** Attach an appropriate Power of Attorney evidencing the authority of the Attorney-in-Fact to act on behalf of the Surety.

END OF SECTION 006113

SECTION 006114 PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that we, _____
as Principal (the "Principal"), and _____, a
company organized and existing under the laws of the _____,
having its principal office at _____
and authorized to do business in the Commonwealth of Pennsylvania, as Surety (the "Surety"), are held and firmly
bound, jointly and severally, unto the Reading School District, as Obligee (the "Obligee"), as hereinafter set forth in
the full and just sum of:

_____ lawful money of the United States of America, for the payment of which sum we bind ourselves, our heirs,
executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WITNESSETH THAT:

WHEREAS, the Principal heretofore has submitted to the Obligee
a _____ certain _____ Bid, dated
_____, 2021 (the "Bid"), to perform General Construction, HVAC Construction, Electrical
Construction, or Plumbing Construction Work for the Obligee, in connection with the First and Second Floors
HVAC and Electrical Upgrades at the Reading School District Administration Building pursuant to Drawings,
Specifications and other related documents constituting the Bidding Documents, which are incorporated into the
Bid by reference (the "Contract Documents"), as prepared by Consolidated Engineers and

WHEREAS, the Contract Documents are incorporated into this Bond by reference and made a part
hereof; and

WHEREAS, the Obligee, is a "contracting body" under provisions of Act No. 385 of the General
Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known as
and cited as the "Public Works Contractors' Bond Law of 1967" (the "Act"); and

WHEREAS, the Act, in Section 3(a), requires that, before an award shall be made to the Principal by the
Obligee in accordance with the Bid, the Principal shall furnish this Payment Bond to the Obligee, with this Payment
Bond to become binding upon the award of the Contract to the Principal by the Obligee in accordance with the
Bid; and

WHEREAS, it also is a condition of the Contract Documents that this Payment Bond shall be
furnished by the Principal to the Obligee; and

WHEREAS, under the Contract Documents, it is provided, *inter alia*, that if the Principal shall furnish this
Payment Bond to the Obligee, and if the Obligee shall make an award to the Principal in accordance with the Bid,
then the Principal and the Obligee shall enter into an agreement with respect to performance of the Work (the
"Agreement"), the form of which Agreement is set forth in the Contract Documents.

NOW, THEREFORE, the terms and conditions of this Payment Bond are and shall be that if the Principal and any subcontractor of the Principal to whom any portion of the Work under the Contract Documents shall be subcontracted, and if all assignees of the Principal and of any such subcontractor, promptly shall pay or shall cause to be paid, in full, all money which may be due any claimant supplying labor or materials in the prosecution and performance of the Work in accordance with the Contract Documents, including, without limitation, any amendment, extension or addition to the Contract Documents, for material furnished, labor supplied or labor performed, then this Payment Bond shall be void; otherwise, this Payment Bond shall be and shall remain in force and effect.

This Payment Bond, as provided by the Act, shall be solely for the protection of claimants supplying labor or materials to the Principal, any subcontractor of the Principal any assignees of the Principal, or any assignees of any subcontractor of the Principal in the prosecution of the Work covered by the Contract Documents, including, without limitation, any amendment, extension or addition to the Contract Documents and is conditioned for the prompt payment of all such materials furnished and labor supplied or performed in the prosecution of any portion of the Work. The term “claimant”, when used herein and as required by the Act, shall mean any individual, firm, partnership, association, corporation, limited liability company or similar entity. The phrase “labor or materials” when used herein and as required by the Act, shall include, without limitation, public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the site of the Work covered by the Contract Documents. As required by the Act, the provisions of this Payment Bond shall be applicable whether or not the material furnished or labor performed enters into and becomes a component part of the public building, public work or public improvement contemplated by the Contract Documents.

As provided and required by the Act, the Principal and the Surety agree that any claimant, who has performed labor or furnished material in the prosecution of the Work in accordance with the Contract Documents, including, without limitation, any amendment, extension or addition to the Contract Documents, and who has not been paid therefore, in full, before the expiration of ninety (90) days after the day on which such claimant performed the last of such labor or furnished the last of such materials for which payment is claimed, may institute an action upon this Payment Bond, in the name of the claimant, in assumpsit, to recover any amount due the claimant for such labor or material; and may prosecute such action to final judgment and may have execution upon the judgment; provided, however, that: (a) any claimant who has a direct contractual relationship with any subcontractor of the Principal or any assignees of any subcontractor of the Principal, but has no contractual relationship, express or implied, with the Principal, may institute an action upon this Payment Bond only if such claimant first shall have given written notice, served in the manner provided in the Act, to the Principal, within ninety (90) days from the date upon which such claimant performed the last of the labor or furnished the last of the materials for which payment is claimed, stating, with substantial accuracy, the amount claimed and the name of the person for whom the Work was performed or to whom the material was furnished; and (b) no action upon this Payment Bond shall be commenced after the expiration of one (1) year from the day upon which the last of the labor was performed or material was supplied, for the payment of which such action is instituted by the claimant and (c) every action upon this Payment Bond shall be instituted either in the appropriate court of the County where the Agreement is to be performed or of such other County as Pennsylvania statutes shall provide, or in the United States District Court for the district in which the Project, to which the Agreement relates, is situated, and not elsewhere.

This Payment Bond is executed and delivered under and subject to the Act, to which reference hereby is made.

The Principal and the Surety agree that any alterations, changes and/or additions to the Contract Documents, and/or any alterations, changes and/or additions to the Work to be performed under the Contract Documents, and/or any giving by the Obligee of any extensions of time for the performance of the Work in accordance with the Contract Documents, and/or any act of forbearance of either the Principal or the Obligee

toward the other with respect to the Contract Documents, and/or the reduction of any percentage to be retained by the Obligee as permitted by the Contract Documents, shall not release, and/or discharge, in any manner whatsoever, the Principal and the Surety, or either of them, or their heirs, executors, administrators, successors and assigns, from liability and obligations under this Payment Bond; and the Surety, for value received, does waive notice of any such alterations, changes, additions, extensions of time, acts of forbearance and/or reduction of retained percentage.

Provided, that it is expressly agreed that this Payment Bond shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract Documents not increasing the Contract Sum more than twenty percent (20%), so as to bind the Principal and the Surety to the full and faithful performance of the Contract Documents as so amended. The term "Amendment", wherever used in this Bond and whether referring to this Bond, the Contract Documents, or the Agreement, shall include any alteration, addition, extension or modification of any character whatsoever.

Provided, further, that no final settlement between the Obligee and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

If the Principal is a foreign corporation or limited liability company (organized under any laws other than those of the Commonwealth of Pennsylvania) then further terms and conditions of this Payment Bond are and shall be that the Principal or the Surety shall not be discharged from liability on this Payment Bond, nor this Payment Bond surrendered until such Principal files with the Obligee a certificate from the Pennsylvania Department of Revenue evidencing the payment in full of all bonus taxes, penalties and interest, and a certificate from the Bureau of Employment and Unemployment Compensation of the Pennsylvania Department of Labor & Industry, evidencing the payment of all unemployment compensation, contributions, penalties and interest due the Commonwealth from said Principal or any foreign corporation or limited liability company, subcontractors thereunder or for which liability has accrued but the time for payment has not arrived, all in accordance with provisions of the Act of June 10, 1947, P.L. 493, of the Commonwealth of Pennsylvania.

[Signature page follows]

**First and Second Floor HVAC and Electrical Upgrades
Reading School District Administration Building
October 2021**

IN WITNESS WHEREOF, the Principal and the Surety cause this Payment Bond to be signed, sealed and delivered this _____ day of _____, 2021.

Individual Principal Witness: _____	By: _____ Name: _____ Trading and/or Doing Business as: _____
---	--

Partnership Principal Name of Partnership: _____ Witness: _____	By: _____ Name: _____ Title: _____ By: _____ Name: _____ Title: _____
--	--

Corporate or Limited Liability Company Principal Name of Entity: _____ Attest: _____	By: _____ Name: _____ Title: _____*
---	---

[SEAL]

* If the signatory is an authorized representative, attach proof evidencing authority to execute on behalf of the corporation or limited liability company

Corporate Surety Name of Surety: _____ Witness or Attest: _____	By: _____ Name: _____ Title: _____**
--	--

[SEAL]

** Attach an appropriate Power of Attorney evidencing the authority of the Attorney-in-Fact to act on behalf of the Surety.

END OF SECTION 006114

SECTION 006115 WAIVER OF LIENS/MECHANICS' LIEN WAIVER

Berks County, Pennsylvania _____, 2021

OWNER: Reading School District

CONTRACTOR: _____ (“Contractor”)

CONTRACT: Contract between the Owner and Contractor dated _____, 2021

PROJECT: All labor and material necessary for the First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building, Pennsylvania

1. Contractor hereby stipulates and agrees for payment of One Dollar (\$1.00) and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, that Contractor, any Subcontractor, any Sub-subcontractor, any materialman, or any other person furnishing labor or materials to any of them, shall not file a lien, commonly called a mechanics’ lien, or claim for any and all amounts that are, from time-to-time, owed by the Owner against the Project or improvements thereon, and any leasehold interests therein, or any part thereof, for any labor or materials furnished. All Subcontractors, Sub-subcontractors, materialmen, or any other person furnishing labor or materials to any of them or to the Contractor for the Project or improvements thereon, any leasehold interests therein, or any part thereof, shall look to and hold the Contractor personally liable for all Subcontracts, labor or materials furnished to the Project or improvements thereon, so that there shall not be any legal or lawful claim of any kind whatsoever against the Owner for and about the erection, construction and completion of the Project or improvements thereon, and any leasehold interests therein, or any part thereof, or with respect to labor and materials furnished under any supplemental contract or arrangement for extra work in connection with alterations and related improvements on the Project and any leasehold interests therein, or any part thereof.

2. This Waiver of Liens/Mechanics’ Lien Waiver, waiving the right of lien, shall be an independent covenant and shall also operate and be effective with respect to work done and materials furnished under any supplemental contract or arrangement for extra work in connection with alterations and related improvements at the Project and any leasehold interests therein.

3. In the event Contractor, any Subcontractor, any Sub-subcontractor, any materialman, or any other person furnishing labor and materials to any of them, files any mechanics’ lien or claim, each hereby irrevocably waives any right to jury trial in any action to strike or discharge the lien.

4. Without limitation of the foregoing, this Waiver of Liens/Mechanics’ Lien Waiver is made and intended to be filed with the Office of the Prothonotary of the county or counties in which the Project is located in accordance with the requirements of Section 402 of the Mechanics’ Lien Law of 1963 of the Commonwealth of Pennsylvania, 49 P.S. § 1402, as amended and supplemented.

5. Each of the terms, provisions, covenants, conditions of this Waiver of Liens/Mechanics’ Lien Waiver, as the case may be, shall be binding upon and inure to the benefit of Owner, Contractor, each Subcontractor of Contractor, each Sub-subcontractor of each Subcontractor, and each party acting for, though, or under Contractor, Subcontractor, or Sub-subcontractor, and their respective heirs, executors, administrators, successors and assigns.

6. In order to give the Owner full power and authority to protect itself and the Project against any and all claims filed by the Contractor, any Subcontractor, any Sub-subcontractor, any materialmen, any other person furnishing labor or materials to any of them, or anyone acting under or through them in violation of the foregoing covenant, the said Contractor, for itself and all persons or entities acting through it, hereby irrevocably authorizes and empowers any Attorney of any Court of Common Pleas of the Commonwealth of Pennsylvania, to appear for it or any of them, in any of the said Courts of Common Pleas as Attorney for it and in its name, mark any and all claims satisfied of record at the cost and expense of the Contractor, including, without limitation, all legal fees (e.g., fees of attorneys, paralegals, and any other legal professionals) related thereto, any and all claims or claim, lien or liens, filed by or for the Contractor, any Subcontractor, any Sub-subcontractor, any materialmen, any other person furnishing labor or materials to any of them, or anyone acting under or through them in violation of the foregoing covenant, or in its or their name against the Project or any part thereof. For such act or acts this shall be good and sufficient warrant and authority and a reference to the Court, Term, and Number in which and where this Waiver of Liens/Mechanics' Lien Waiver shall have been filed shall be a sufficient exhibit of the authority herein contained to warrant such action, and the Contractor does hereby remise, release and quit-claim all rights and all manner of errors, defects and imperfections whatsoever in entering such satisfaction or in any way touching or concerning the same.

7. In the event of a dispute between the Contractor and the Owner, to the extent that the Owner incurs any legal fees, professional fees, or other costs or expenses in defending, removing, marking satisfied any mechanics' liens or any other expenses incurred by Owner in connection with mechanics' lien claims and/or judgments related to the Project, the Contractor will be solely responsible for those amounts incurred by the Owner, which will be deducted to the extent available, from any amounts due the Contractor under the Contract. If the amount due the Contractor is not sufficient to cover such cost, the Contractor shall pay the difference to the Owner within ten (10) days of receipt of the Owner's invoice for such legal fees, professional fees or other costs and expenses.

IN WITNESS WHEREOF, Contractor, acting by its duly authorized officers and intending to be legally bound, has hereunto caused this instrument to be duly executed as of the day and year first above written.

CONTRACTOR:

By: _____

Witness

Printed Name: _____

Title: _____

Date: _____

SECTION 00 72 00 - GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

See attached AIA A201-2017, as modified by Owner.



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
Admin HVAC Phase II (Floors 1 and 2 and Basement) Project

THE OWNER:
(Name, legal status and address)
Reading School District 800 Washington Street
Reading, PA 19601

THE ARCHITECT/ENGINEER (hereinafter and for purposes of this document and the contract documents, the "Architect"):
(Name, legal status and address)
Consolidated Engineers 1022 James Drive
Leesport, PA 19533

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

Contractor acknowledges and warrants that it has closely examined all of the Contract Documents, that they are suitable and sufficient to enable the Contractor to complete the Work in a timely manner for the Contract Sum, and that they include all Work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in full compliance with all applicable standards, codes, laws, ordinances, regulations and/or requirements of any state, federal or other governmental agency.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams. The Drawings are diagrammatical and show the general arrangement and extent of the Work; exact locations and arrangements of parts shall be determined as the Work progresses and shall be subject to the Architect's approval. No extra compensation will be allowed due to conflicts, inconsistencies, or discrepancies between actual dimensions and those indicated. The right is reserved by the Architect to make any reasonable change in location of equipment, ductwork and piping, prior to roughing in without involving additional compensation to the Contractor.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

The designation "Owner" in the Contract Documents shall refer to Reading School District, 800 Washington Street, Reading, Pennsylvania, 19601, for the construction work in Berks County known as: "Admin HVAC Phase II (Floors 1 and 2 and Basement) Project"

(Paragraph Deleted)

The Owner's Representative shall be Mr. Dennis Campbell, Facilities/Construction, for Reading School District.

§ 2.1.2 The Owner has engaged a Project Representative, Fidevia LLC, Lititz Pike, Lititz, Pennsylvania, (Fidevia) to oversee and represent its interests throughout the duration of the Project. The Contractor shall reasonably cooperate with the instruction provided by

such

Project Representative. Provided, however, such Project Representative shall not have the authority to bind the Owner.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall not be responsible for furnishing surveys (unless required for the execution of the Work and requested by the Contractor in writing) or other information as to the physical characteristics of, legal limitations of or utility locations for the Project site which shall not constitute one of the Contract Documents. The Contractor represents that it is familiar with the Project site and has received all information it needs concerning the condition of the Project site. The Contractor represents that it has inspected the locations of the Work and has satisfied itself as to the condition thereof, including, without limitation, all structural, surface and reasonably ascertainable subsurface conditions. Based upon the foregoing inspections, understandings, agreements and acknowledgements,

the Contractor agrees and acknowledges (1) that the Contract Sum is just and reasonable compensation for all Work, including foreseen and foreseeable risks, hazards and difficulties in connection therewith, and (2) that the Contract Time is adequate for the performance of the Work.

The Contractor shall have no claims for surface or reasonably ascertainable subsurface conditions encountered. The Contractor shall exercise special care in executing subsurface Work in proximity of known subsurface utilities, improvements, and easements.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect.

In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. In no event shall the Owner, Project Representative, or Architect have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents. Hence, the Owner and Contractor hereby acknowledge and agree that the Owner has retained the Contractor as an independent contractor to perform the Work on the Project. It is expressly understood and agreed that the presence on the jobsite of the Owner's visiting officers or employees, the Owner, Project Representative, and Architect or supervisory personnel employed by Owner and the making by such personnel of any inspections of the Contractor's Work, materials, tools or equipment, or of the finished Work of the Contractor and their approval of same, or failure to take exception thereto, shall in no way relieve the Contractor from its absolute responsibility to perform its Work and furnish its materials in accordance with the requirements of the Contract Documents. Any failure by the Owner, Project Representative, or Architect to take exception to any Work of the Contractor shall not constitute a ratification or approval of the Work or work methods employed by the Contractor if the same did not in fact comply with the requirements of the Contract Documents.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

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§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.1.1 The Contractor is to appoint by written commitment a single representative on site who has the authority to act on behalf of the Contractor and its Subcontractors and suppliers.

§ 3.3.1.2 At any time within the Construction Period, the Owner and Architect shall have the right and the authority to require the replacement of the Contractor's Project Manager, Superintendent, or Foreman.

§ 3.3.1.3 The Architect shall have the authority to direct the Contractor to assign additional supervisory personnel to ensure compliance with the schedule and quality requirements at no addition to the Contract Sum.

§ 3.3.1.3.1 When the Work is being performed at different locations of the Project site, supervision must be assigned to each location where Work is being performed. When extended hours are required to maintain the progress schedule, such as multiple shifts and/or additional work days, adequate supervision shall be required of the

Contractor during these times. The competence level and ability of supervisory personnel must be adequate to perform the Work.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors. After Award of Contract, any claims for additional costs associated with completion of the Work within the required Contract time frames will not be considered.

Contractors who feel extra time, in any form such as shift work, overtime, and premium time, is necessary to meet Contract requirements regardless of trade, should include these costs in their bids.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 The Contractor's supervision of work shall include expediting and coordination of work of trades. The Contractor shall perform all supervising and procuring required to ensure delivery of materials to maintain work schedules of sub-contractors and progress schedules of the Project to ensure full completion of work, to supply equipment or instruments necessary to complete specified test, checks, balancing of system, and to furnish operating instructions, etc.

§ 3.3.5 The Contractor, its employees or its subcontractors shall not install any product or equipment in a manner which is in conflict with the manufacturer's recommendations. If the manufacturer of the product or equipment has requirements which cannot be met by the specific application indicated, the Contractor shall bring this information to the attention of the Architect. Products or equipment installed contrary to the manufacturers' requirements shall be replaced at no additional cost to the Owner unless specifically authorized in writing by the Architect.

§ 3.3.6 The Contractor's representatives shall be capable of providing intelligent and efficient supervision, coordination and scheduling through all phases of the Work.

§ 3.3.7 No alleged verbal agreement or conversation with any officer, agent, or employee of the Owner, Project Representative, or Architect, either before or after the execution of the Contract, shall affect or modify the terms or obligations contained in the Contract Documents. Failure to comply with any or all of the above requirements will not relieve the Contractor from the responsibility of properly estimating the difficulty or cost of successful completion of the Work, nor from the responsibility for the faithful performance of the provisions of the Agreement and in accordance with the Contract Documents. Modifications or changes may be made in writing only. This requirement may not be waived under any circumstances.

§ 3.3.8 The Contractor has reviewed the completion dates and times set forth in the Contract Documents, agrees that such dates and times are reasonable and commits to achieve them. The Contract Sum includes costs associated with completion by those dates and times, including, but not limited to, costs associated with out-of-sequence work, come-back work, stand-by work, stacking of trades, coordination with the schedules and work of separate contractors, allowing sufficient time, work and storage areas, and site access for separate contractors to timely progress and complete their work, overtime, expediting and acceleration that may be required to complete the Work by those dates and times.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. Contractor shall pay Architect and the Project Representative directly for any costs associated

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with reviewing substitution requests and revising the drawings and specifications as a result of any substitution requests.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.3.1 Workers shall not smoke within the limits of the Owner's property boundaries or as otherwise required by Federal legislation, Title X, P.L. 103-227, Goal 2000, Educate America Act of 1994 as amended from time to time, including without limitation, 20 U.S.C.A. Section 6081, et seq., the Pro-Children Act of 1994. Nothing in the Educate America Act of 1994 or the codification of same in the Pro-Children Act of 1994 shall preempt any provision of law of a state or political subdivision of a state that is more restrictive. Workers shall not possess or consume alcoholic beverages when within the limits of the Owner's property boundaries. The Contractor shall require its employees and agents, and its Subcontractor's employees and agents to work diligently and behave in an orderly manner at all times when at or about the Project site and shall remove from the Project any employee whose conduct is deemed objectionable. Unless otherwise approved by the Owner, persons performing Work shall not use the Owner's building facilities, including, without limitation, restroom facilities.

§ 3.4.4 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). Substitutions for materials, methods, assemblies, or products, required to achieve a bona fide bid, must be submitted to the Architect ten (10) days prior to the bid submission due date, and be approved by the Architect prior to acceptance of the construction bid.

§ 3.4.5 By making requests for substitutions based on Subparagraph 3.4.4 above, the Contractor:

- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 certified that the cost data presented is complete and includes all related costs under this Contract, except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
- .4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
- .5 represents that, in the event incorporation of a substituted item or assembly into the Work will require revisions or additions to the Work of other construction contracts, the Contractor proposing to use such substituted materials, products, or assembly will bear the cost of such revisions or additions at no charge in the Contract Sum.

§ 3.4.6 Discrimination - The Contractor shall agree:

- .1 That in the hiring of employees for the performance of the Work under the Contract Documents, or for any subcontract thereunder, no Contractor, Subcontractor nor any person acting on behalf of such Contractor or Subcontractor, shall, by reason of gender, race, creed, or color, discriminate against any citizen of the Commonwealth of Pennsylvania who is qualified and available to perform the Work to which the employment relates;
- .2 That no Contractor, Subcontractor, nor any person on his behalf shall in any manner discriminate against or intimidate any employee hired for the performance of the Work on account of gender, race, creed or color;
- .3 The Contractor and Subcontractors shall establish and maintain a written sexual harassment policy and shall inform their employees of the policy. The policy must contain a notice that sexual harassment will not be tolerated and employees violating the policy will be disciplined.
- .4 The Contractor shall not discriminate by reason of gender, race, creed or color against any Subcontractor or supplier who is qualified to perform the Work.
- .5 The Contractor and each Subcontractor shall furnish necessary employment documents and records, and shall permit access to, to their books, records and accounts for the purpose of any investigation involving compliance with Section 3.4.6.
- .6 The Contractor shall include, without limitation, the provisions of Section 3.4.6 in every subcontract so

that such provisions will be binding upon each subcontractor.

- .7 The Owner may cancel or terminate the Contract for violation of the terms of Section 3.4.6, and, in the event of such termination, all money due or to become due under the Contract Documents may be forfeited.

§ 3.4.7 Owner specifically reserves the right to reject any person Owner deems unfit to be permitted on school grounds and in proximity to students. Upon written notice from Owner, Contractor shall have all such persons removed from the Project. Owner's right to declare such person unfit shall not be limited to the required exclusion of persons from school property as set forth in Section 10111 of the Pennsylvania Public School Code and/or Subchapter C.2 of the Child Protective Services Law.

§ 3.4.8 Work specified which becomes impossible due to strike, loss of plant through fire or flood, bankruptcy, or other unforeseeable cause beyond Contractor's control, shall be substituted equally from another source subject to substitution procedures in the Contract Documents. Substitute work shall not entitle the Contractor to either an increase in cost or an extension of contract time. Notwithstanding the same, if the substitute work results in a savings to Contractor, Owner shall be entitled to a reduction in the Contract Sum. In any event, substitute work shall be incorporated into the Project through a properly executed Change Order.

- .1 Items not ordered by the Contractor in a timely manner for incorporation into the Work will not entitle the Contractor for additional time or compensation.
- .2 Substitute work offered and approved shall not be a basis for contingent extra charges or additional charges due to changes in related work, such as rough-in, changes in supporting foundations, and other related work.
- .3 The Contractor shall assume full responsibility for adequacy of substitute work.

§ 3.4.9 Whether indicated or not, all materials on the Project shall be asbestos-free and lead-free. If any suspected asbestos-containing or lead-containing materials are installed, the Owner has the right to have the material in question tested and if proven to contain asbestos or lead, the Contractor shall remove all material in question and replace it with acceptable material at no additional cost to the Owner.

§ 3.4.10 Competent Workmen: As set forth more fully in Section 13, no person shall be employed to do Work under such Contract except competent and first class workmen and mechanics. No workmen shall be regarded as competent first class, except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours' Work as shall be established and current rates of wages paid for such hours by employers of organized labor in doing of similar Work in the District where Work is being done.

§ 3.4.11 The Contractor shall not employ workers, materials or equipment which may cause strikes, work stoppages or any disturbances by workers employed by the Contractor or the Owner or other Contractors or Subcontractors in connection with the Work of the Project or the location thereof. The Contractor agrees that all disputes as to jurisdiction of trades shall be adjusted in accordance with any plan for the settlement of jurisdictional disputes which may be in effect either nationally or in the locality in which the Work is being performed and that is shall be bound and abided by such adjustments and settlements of jurisdictional disputes, provided that the provisions of this Article shall not be in violation of or in conflict with any provisions of law applicable to the settlement of such disputes. Should the Contractor fail to carry out or comply with any of the foregoing provisions, the Owner shall have the right, in addition to any other rights and remedies provided by the Contract Documents or by law, after three day's written notice mailed or delivered to the latest known address of the Contractor, for all or any portion of the Work, and, for the purpose of completing the Work, to enter upon the premises and take possession, in the same manner, to the extent and upon the same Terms and Conditions as set forth in Paragraph 14.2.

§ 3.4.11.1 The Contractor shall remove from the Project such employees of the Contractor or of any Subcontractor as the owner requests be removed, with or without reason.

§ 3.4.12 The Contractor in making or ordering material shipments shall not consign or have consigned materials, equipment or any other items in the name of the Owner. The Owner shall not be under any obligation to make payment for charges or deposits on shipments made by or to the Contractor but may, at its option, pay such charges in which case the Contractor shall reimburse the Owner for the amount of such payments plus a service charge of twenty-five percent (25%) of the amount so paid.

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§ 3.4.13 Contract Sum Not Adjusted for Rising Costs: The Bid (and hence the Contract Sum) for the Contract must be guaranteed for the duration of the Project and shall thereby have incorporated within it any or all escalation factors related to market conditions. Notwithstanding any other provision in the Contract Documents to the contrary, Contractor's Contract Sum is intended to include all increases in cost, foreseen or unforeseen, including, without limitation, increases in costs arising from supply shortages, unusual delay in deliveries, increases in market prices for materials, labor, taxes and/or other causes beyond the Owner's control, all of which are to be borne solely by the Contractor supplying the materials and/or labor to the Project. All loss and/or damage arising from any of the Work performed under this Agreement through unforeseen or unusual obstructions, difficulties or delays which may be encountered in the prosecution of same shall be borne solely by the Contractor prosecuting the Work.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.6.1 The Contractor hereby accepts and assumes full and exclusive liability for payment of all sales taxes, state and municipal taxes including, without limitation, business privilege taxes, use taxes, and all contributions and payroll taxes under the provisions of Federal law or the laws of the Commonwealth of Pennsylvania, including, but not limited to, Social Security Acts, as to all employees engaged in the performance of the Work subject to the Contract Documents, and further agrees to meet all requirements that may be specified under regulations of government officials having jurisdiction over the Work. All sales taxes, state and municipal taxes, business privilege taxes and use taxes are expressly included within the compensation owed to the Contractor under the terms of the Contract Documents. It is further agreed that the Owner shall have the right to deduct the amount of any and all such taxes from the compensation owed to the Contractor under the terms of the Contract Documents at any time, in the Owner's sole discretion, as the Owner deems advisable, it being agreed that the Owner shall have the right to deduct any and all such moneys from the next payments due under the Contract Documents and from the retained percentages.

§ 3.6.2 The Contractor hereby accepts and assumes full and exclusive liability for and shall indemnify, protect and save harmless the Architect and Owner from and against the payment of:

- .1 All contributions, taxes or premiums (including, without limitation, interest and penalties thereon) which may be payable under any unemployment insurance laws of any state, the Older Workers Benefit Protection Act of 1990 (OWBPA) (P.L. 101-433, October 16, 1990, 104 Stat. 978), as amended from time to time, the Federal Social Security Act, as amended from time to time, Federal, State, County and/or Municipal tax withholding laws, or any other laws, measured upon the payroll of or required to be withheld from employees, by whomever employed, engaged in the Work.
- .2 All sales, use, personal property and other taxes (including, without limitation, interest and penalties thereon) required by any Federal, State, County, Municipal or any other laws to be paid or collected by the Contractor or any of its Subcontractors or vendors or any other person acting for, through or under it or any of them by reason of the performance of the Work or the acquisition, ownership, furnishing or use of any materials, equipment, supplies, labor, services or other items for or in connection with the Work.

- .3 All pension, welfare, vacation, annuity and other union benefit contributions payable under or in connection with labor agreements with respect to all persons, by whomsoever employed, engaged in the Work.
- .4 In the event that any law is or has been passed, or any rule or regulation pursuant thereof is enacted, which requires the Owner to pay, either directly or indirectly, the amount of any such sales, use, personal property and other taxes (including, without limitation, interest and penalties thereon) required by any Federal, State, County, Municipal or any other laws or should any such law, rule or regulation direct the Owner to collect the same, or make the Owner liable for the collection thereof, or make the Owner responsible therefor, it is covenanted and agreed that the Contractor shall fully and completely make all payments therefor, and shall fully and completely indemnify and save the Owner harmless from any and all such taxes.

§ 3.6.3 The Contractor represents that it based its Bid on the properly charged, collected and remitted sales tax due on only those "construction activities" which are presumed to become a permanent part of the real estate in accordance with 61 Pa. Code Section 31.11, et seq., as amended from time to time. The Contractor shall not include in its Bid any tax for "sales activities" which do not become a permanent part of the real estate in accordance with 61 Pa. Code Section § 31.11, et seq., as amended from time to time.

§ 3.6.4 The Contractor shall keep detailed records of all materials, equipment and labor furnished in connection with the Work and shall keep such full and detailed accounts as may be necessary for the proper financial management under the Contract Documents and the system utilized by the Contractor shall be satisfactory to the Owner. The Owner or its representative shall be afforded access to the Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, certifications and similar data relating to the Contract Documents. Further, the Owner or its representative shall have the authority, but not the obligation, to require the Contractor to provide the Owner with certified payroll records for the labor furnished by the Contractor in connection with the Work.

§ 3.6.4.1 The Contractor shall preserve all such records for a period of three (3) years, or for such longer period as may be required by law, after final payment. To the extent requested by Owner, copies of such records will be provided by the Contractor. Also, the Contractor shall immediately transmit to the Owner copies of all invoices and receipts for materials, equipment and labor furnished in connection with the Work by the Contractor and any other materials that reflect sales and use tax paid or not paid.

§ 3.6.5 The Contractor agrees to assign and transfer to the Owner all of its rights to sales and use tax which may be refunded as a result of a claim for refund for materials and/or equipment purchased for the Project. The Contractor further agrees that it will not file a claim for refund for any sales or use tax which is the subject of this assignment. This assignment will include, without limitation, any tax erroneously paid by the Contractor. Further, the Contractor agrees to execute all such documents as may be necessary to effectuate such an assignment.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.2.1 The Contractors shall comply with all aspects of the Federal Occupational Safety and Health Act of 1970 (OSHA) and all up to date amendments thereto, including specific responsibilities to perform reporting and recording requirements. The Contractor is responsible to obtain information regarding its responsibilities under the Act.

§ 3.7.2.2 The Contractor shall comply with all aspects of Pennsylvania Act 287 of 1994, as amended by Act 187 of 1996 and OSHA § 1926.651 requiring, among others, contractors intending to perform excavation or demolition work in a site within a political subdivision, to ascertain the location and type of utility lines and pipes at each site and to notify the utility company or companies not less than three (3) working days in advance of performing the

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excavation or demolition. Call Pennsylvania One Call System, Inc., (1.800.242.1776) or contact them at (www.paonecall.org)

§ 3.7.2.3 The Contractors at all times shall observe and comply with all Federal and State Laws and local ordinances and regulations in any manner affecting the conduct of the Work and all such orders or decrees as exist at present and those which may be enacted later by bodies or tribunals having jurisdiction or authority over the Work and shall indemnify and hold harmless the Owner and all his officers, agents and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees, agents or anyone acting on behalf of the Contractor. If the Contractor, any of its Subcontractors or any Sub-Subcontractors, performs Work contrary to laws, statutes, ordinances, building codes, and rules and regulations, the Contractor shall assume full responsibility for such Work and shall bear all costs required to bring the Work into compliance with laws, including any fines or penalties resulting from such non-compliance.

§ 3.7.2.4 Each and every provision of law and clause required by law to be included in the Contract Documents shall be deemed to be inserted therein and the Contract Documents shall be read and enforced as though they were included herein, and if through mistake or otherwise, such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

§ 3.7.2.5 It is the responsibility of the Contractor to determine what local ordinances, if any, will affect the Work. The Contractor shall check for any County, City, Borough, or Township rules or regulations applicable to the areas in which the Project is being constructed and in addition, the Contractor shall check for any rules or regulations of other organizations having jurisdiction, including, but not limited to, chambers-of-commerce, industries, or utility companies who have jurisdiction over lands which the Contractor furnishes materials, equipment and labor in connection with the Work. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 7 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 NO CASH ALLOWANCES

(Paragraphs Deleted)

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to 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 the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

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§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

(Paragraph Deleted)

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless and defend, immediately upon demand, the Owner, Architect, Architect's consultants, and agents and employees of any of them (the "Indemnified Parties") from and against claims, damages, losses and expenses, including but not limited to attorneys' fees and defense costs, arising out of or resulting from performance of the Work, bodily injury, sickness, disease or death, or to injury to any person, including, without limitation, Contractor's or any Subcontractor's employees, or destruction of tangible property (other than the Work itself), but only to the extent caused by the acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by an Indemnified Party. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

In the event that any such claim, loss, cost, expense, liability, damage or injury arises or is made, asserted or threatened against the Owner for which the Contractor or its insurer does not admit coverage, or if the Owner reasonably determines such coverage to be inadequate, the Owner shall have the right to withhold from Contractor any payments due or to become due to the Contractor in an amount sufficient to protect the Owner from such claim, loss, cost, expense, liability, damage or injury, including, but not limited to, legal fees and expenses reasonably necessary for the defense thereof.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

§ 3.18.3 In the event that the Contractor is requested but refuses to honor the indemnity obligations hereunder, then the Contractor shall, in addition to all other obligations, pay the costs and fees, including, without limitation, attorneys' fees, incurred by an Indemnified Party to enforce the indemnity obligations hereunder. Furthermore, the

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Contractor shall be solely responsible for all legal fees incurred by the Owner in defending, removing, marking satisfied mechanics' liens or any other expenses incurred by Owner in connection with mechanics' lien claims and/or judgments.

§ 3.19 REPRESENTATIONS AND WARRANTIES

§ 3.19.1 Contractor shall be responsible for preparing and completing its own comprehensive list of items to be completed or corrected (punch-list) in order to submit for Substantial Completion. If after the punch-list is submitted and upon inspection, it is found that a Contractor's punch-list is incomplete, lengthy or ill prepared, the Substantial Completion request will be denied. If the Contractor's incomplete, lengthy or ill prepared punch-list or the Contractor's inability to complete its punch list and, therefore, complete the Contract, causes the Architect to prepare a punch list, the Contractor will be solely responsible for the direct payment to the Architect of the Architect's fees incurred in preparing the punch-list.

In the event the Contractor or its Subcontractor fails to complete these punch-lists, the Owner may: (i) exercise any available remedies under this Agreement, at law, and/or at equity to correct or complete deficient Work or retain a third party to correct or complete such Work at the cost of the defaulting Contractor; and (ii) retain and deduct from any payments or retention otherwise due to the defaulting Contractor any fees and expenses for services required to be provided to correct or complete such deficient Work. The Architect and/or any of its consultants or representatives and/or the Owner will be compensated for such additional work at standard prevailing rates by the Contractor.

The Contractor represents and warrants the following to the Owner (in addition to the other representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute this Agreement, which representations and warranties shall survive the execution and delivery of this Agreement and the Final Completion of the Work:

- .1 that it is financially solvent, able to pay its debts as they mature and possess sufficient working capital to complete the Work and perform its obligations under the Contract Documents;
- .2 that it is able to furnish the personnel, tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder and has sufficient experience and competence to do so;
- .3 that it is authorized to do business in the Commonwealth of Pennsylvania and is properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over it and over the Work for the Project;
- .4 that its execution of this Agreement and its performance thereof is within its duly authorized powers;
- .5 that it is familiar with all applicable laws, ordinances and regulations, which may in any way affect the Work of those employed herein, including, but not limited to, any special acts relating to the Work or to the Project of which it is a part;
- .6 that such temporary and permanent Work required by the Contract Documents as is to be done by it, can be satisfactorily constructed and used for the purposes for which it is intended, and that such construction will not injure any person or damage any property;
- .7 that it is familiar with local trade jurisdictional practices;
- .8 that it has carefully examined the Plans, the Specifications and the Project site for the Work, and that, from its own investigation, it has satisfied itself as to the nature and location of the Work, the character, quality and quantity of the surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the Work, and the general local conditions, and all other materials which may in any way affect the Work or its performance; and
- .9 that it has determined what local ordinances, if any, will affect its Work. The Contractor has checked for any County, City, Borough, or Township rules or regulations applicable to the area in which the Project is being constructed and in addition, the Contractor has checked for any rules or regulations of other organizations having jurisdiction, including, but not limited to, such as chambers-of-commerce, planning commission, industries, or utility companies who have jurisdiction over lands which the Contractor occupies. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

§ 3.20 The Contractor agrees (in addition to the representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute the Contract, that the Contractor shall be restricted to the

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rights and remedies set forth in Article 15 of these General Conditions as between the Contractor and the Owner. This Paragraph 3.20 shall survive the expiration or sooner termination of the Contract.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

(Paragraph Deleted)

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect and Project Representative about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's and Project Representative's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect and Project Representative have authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 The Project Representative will assist the Architect in carrying out the Architect's responsibilities at the site.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the

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Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. No increase to the Contract Sum shall be permitted for any such substitution.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

§ 5.5 PAYMENTS TO SUBCONTRACTORS OR MATERIAL SUPPLIER BY THE CONTRACTOR

§ 5.5.1 The Contractor shall pay each Subcontractor, upon receipt of payment from the Owner, an amount equal to the percentage of completion allowed to the Contractor, on account of such Subcontractor's work, less the percentage retained from payments to the Contractor. The Contractor shall also require each Subcontractor to make similar payments to Sub-Subcontractors. All such payments shall be paid within twenty (20) days. In the event a

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Subcontractor or material supplier alleges that the Contractor has failed to pay it in full, the Owner may, in addition to its other rights, set off said amounts from any amount due and owing to the Contractor.

§ 5.6 PAYMENTS TO SUBCONTRACTORS BY THE OWNER.

§ 5.6.1 If the Owner fails to approve an Application for Payment for a cause which the Owner and Architect determine is the fault of the Contractor, and not the fault of the particular Subcontractor, or if the Contractor fails to make payment which is properly due to a particular Subcontractor, the Owner may pay such Subcontractor directly, less the amount to be retained under its Subcontract.

§ 5.6.2 The Owner shall have no obligation to pay, or to see to the payment of, any monies to any Subcontractor or material supplier. Nothing contained in Paragraph 5.6.1 shall be deemed to create any contractual duty of the Owner to any Subcontractor or to create any rights in any Subcontractor against the Owner.

§ 5.6.3 The Contractor shall promptly advise the Owner and the Architect of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor claiming any default by the Contractor in any of its obligations to such Subcontractor.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor through the Project Representative. The Contractor shall participate with other separate contractors, Project Representative, and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

Notwithstanding, it shall be the Contractor's sole responsibility to ensure its Work is properly coordinated and sequenced with Owner's own forces and each separate contractor to ensure the orderly completion of the Contractor's Work in accordance with the Contract Time without interfering or delaying the performance of the Owner's own forces or separate contractors

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible

for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5. The Contractor agrees to defend, indemnify and hold harmless the Owner from and against any claims or damages brought by a separate Contractor arising out of actions or omissions of the Contractor, its Subcontractors, Sub-Subcontractors or suppliers in performing the Work under the Contract Documents.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;

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- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 As referred to in sub-paragraph 7.3.8, the reasonable amount for overhead and profit shall be calculated as follows:

	Overhead	Profit
For cost of work performance by the Contractor's or Subcontractor's own forces	5%	5%
For cost of work performed by subcontract or sub-contract to the Contractor or Subcontractor	5%	5%

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Overhead shall be calculated against the cost of the work. Profit shall be calculated against the sum of the cost of the work and overhead.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.2.4 It is mutually agreed by and between the parties hereto that time shall be an essential part of the Contract and that in case of the failure on the part of the Contractor to complete the Project within the time specified and agreed upon, the Owner will be damaged thereby. Further, it is mutually agreed that the amount of said damages, including, but not limited to, loss of use, expenses for inspection, superintendence and necessary traveling expenses, being difficult, if not impossible, of definite ascertainment and proof, it is hereby agreed that the reasonable amount of liquidated damages shall be in accordance with Paragraph 9.11.

§ 8.2.5 **COMPLETION OF PROJECT:** The Project shall be completed within the dates specified.

§ 8.2.5.3 **EXTRAORDINARY MEASURES.** In the event the Owner, after consultation with the Architect, determines that the performance of the Work has not progressed or reached the level of completion required by the Contract Documents, and the Project construction schedule, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, but not limited to, working additional shifts or overtime; supplying additional manpower, equipment, and facilities; and other similar measures (referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the Project construction schedule and failure to comply shall be considered as breach of the Contract Documents. The Contractor shall not, under any circumstances, be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by Owner under or pursuant to this Paragraph 8.2.5.3.

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§ 8.2.5.4 The Owner may exercise its rights pursuant to Paragraph 8.2.5.3 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any completion dates set forth in the Contract Documents.

§ 8.2.6 DELIVERY: Delivery of equipment shall be completed in a manner to comply with construction schedule requirements. Project scheduling may require quick-ship and/or express courier at premium rates that the contractor will be responsible for under contract. Any charges incurred by the Owner as a result of failure to complete installation by the date specified, such as temporary rentals, custodial overtime, etc. will be deducted from the vendor's invoice.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's reasonable control; or by delay authorized by the Owner pending mediation and litigation; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order to the extent such delay shall prevent the Contractor from achieving Substantial Completion within the Contract Time and if the performance of the Work is not, was not, or would not have been delayed by any other cause for which the Contractor is not entitled to an extension in the Contract Time under the Contract Document. The Contractor further acknowledges and agrees that adjustments in the Contract Time for delay will only be allowed to the extent such delay is not caused by the Contractor, could not have been anticipated by the Contractor, could not be limited or avoided by the Contractor's timely notice to the Owner of the delay, and is of a duration not less than one (1) day.

§ 8.3.1.1 No extension of Contract Time will be considered or approved if the act or occurrence constituting the basis of the request or claim is for non-delivery of materials due to any act or neglect of the Contractor, or the failure of the Contractor to employ, furnish or obtain, as necessary for the timely prosecution of the Work, shop drawings, sufficient labor, materials or equipment, or other matters which are within the control of the Contractor. Any delay which results due to any of the foregoing causes shall be the sole responsibility of the Contractor.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 No payment or compensation will be made to the Contractor as compensation for damages for any delays or hindrances from any cause whatsoever in the progress of the Work, notwithstanding whether such delays be avoidable or unavoidable. The Contractor's sole remedy for delays shall be an extension of Contract Time, pursuant to and only in accordance with this Paragraph 8.3. Such extension shall be a period equivalent to the time lost, day for day, by reason of any and all of the aforesaid causes. Nor will the Contractor be permitted to make any claim for acceleration or for costs or expenses associated with acceleration nor will the Contractor be permitted to make a claim for out-of-sequence work (e.g., winter protection costs) or expenses, damages, loss of profits (anticipated or otherwise) or charges of any nature whatsoever (including, but not limited to, legal fees and professional fees). In the event that the Contractor chooses to assert such a claim for delay, acceleration or out-of-sequence work, or litigate this provision, and the Contractor fails to prevail as to its entire claim in its litigation, the Contractor shall be liable to the Owner and shall reimburse the Owner for any legal fees, professional fees, costs or expenses associated with analyzing, defending or otherwise opposing any such claim or litigation.

§ 8.3.4 The Contractor shall recognize and reasonably anticipate that as the job progresses the Owner's representative may be making changes in and updating the construction schedules. Therefore, no claim for an increase in the Contract Sum for either acceleration, delay or out-of-sequence work will be allowed for decisions as to extensions of time pursuant to Paragraph 8.3 or for other changes in the construction schedules which may be experienced.

§ 8.3.5 No extension of Contract Time granted by the Owner shall be or shall be deemed to be a waiver by the Owner of any rights accruing to it under the Contract, and no extension of Contract Time granted by the Owner shall relieve or shall be deemed to relieve the Contractor from full responsibility for performance of the Work of the Contract.

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§ 8.3.6 Should the Owner be prevented or enjoined from proceeding with the Project either before or after the start of construction by reason of any litigation or any other reason beyond the control of the Owner, the Contractor shall not be entitled to make or assert claims for damage by reason of said delay or for acceleration or out-of-sequence work; but time for completion of the Work will be extended to such reasonable time as the Owner and Architect may determine will compensate for time lost for such delay with such determination to be set forth in writing.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 By the 20th day of each month, the Contractor shall submit to the Architect and Project Representative a draft itemized Application for Payment prepared in accordance with the schedule of values and covering all Work completed as of the 15th day of the month, including Saturdays if applicable. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner, Project Representative, or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet. Weekly Payroll Certification forms must accompany each Application for Payment.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

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§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- .7 repeated failure to carry out the Work in accordance with the Contract Documents; or
- .8 failure to submit Wage Certifications required by the Department of Labor and Industry to demonstrate payment of Prevailing Wages to the employees of Contractor and each Subcontractor.

§ 9.5.2 If the Contractor disputes any determination by the Architect with regard to any Certificate of Payment, the Contractor shall nevertheless expeditiously continue to prosecute Work.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

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§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect. Such payment by the Owner shall not constitute approval or acceptance of any item of cost in the Application for Payment. No partial payment made hereunder shall be or be construed to be acceptance or approval of that portion of the Work to which such partial payment relates or relieve the Contractor of any of its obligations hereunder with respect thereto.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

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§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall not constitute a waiver of Claims by the Owner
(Paragraphs Deleted)

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11.1 The Contractor and Contractor's Surety shall be liable for and shall pay the Owner the cost of expenses incurred by the Owner resulting from the Contractor's delay in completing the Work of the contract within the Contract Time or failing to submit information required by the Contract Documents and Specifications, as liquidated damages, and not as a penalty, in the amount of Five Hundred Dollars (\$500.00) per calendar day of delay, for each calendar day of delay until the work is substantially complete at each phase of construction, subject to adjustments of the Contract Time as provided in the Contract Documents. In the event the Contractor or Surety litigates the validity of this provision, and does not completely prevail on their challenge, the Contractor and Surety, jointly and severally, shall be liable for legal fees, professional fees, costs or other expenses and damages incurred by the Owner in defending the challenge.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 The Contractor shall not use or store hazardous materials or equipment, or consider unusual methods the Contractor may believe are necessary, without first obtaining written consent from the Owner for each individual consideration. Use of explosives is not permitted under any circumstances.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended

appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

Prior to the commencement of any Work and until completion and final payment is made for the Work, the Contractor shall, at its sole expense, maintain the following insurance on its own behalf, with an insurance company

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or companies having an A.M. Best Rating of "A-Class VII" or better, and furnish to the Owner Certificates of Insurance evidencing same.

The term "Contractor" as used in these Insurance Requirements shall mean and include Subcontractors and Sub-Subcontractors of every tier..

§ 11.1.1.1 Workers' Compensation and Employer's Liability: in the Commonwealth of Pennsylvania and shall include, where applicable, U.S. Longshoremen's and Harbor Workers' Coverage.

Workers' Compensation Coverage: Statutory Requirements

Employers Liability Limits not less than:	
Bodily Injury by Accident:	\$100,000
Each Accident Bodily Injury by Disease:	\$100,000
Each Employee Bodily Injury by Disease:	\$500,000 Policy Limit

§ 11.1.1.2 Commercial General Liability: (including Premises - Operations, Independent Contractors, Products/Completed Operations, Broad Form Property Damage, Contractual Liability (including Liability for Employee Injury assumed under a Contract), and Explosion, Collapse and Underground Coverages).

Occurrence Form with the following limits:

General Aggregate:	\$3,000,000
Products/Completed Operations Aggregate:	\$2,000,000
Each Occurrence:	\$1,000,000
Personal and Advertising Injury:	\$1,000,000
Fire Damage (any one fire):	\$50,000
Medical Expense (any one person):	\$5,000

Products/Completed Operations Coverage must be maintained for a period of at least two (2) years after final payment. The General Aggregate Limit must apply on a Per Project basis.

§ 11.1.1.3 Automobile Liability:

Coverage to include: All Owned, Hired and Non-Owned Vehicles; Contractual Liability Coverage (including Liability for Employee Injury assumed under a Contract)

Per Accident Combined Single Limit	\$1,000,000
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§ 11.1.1.4 Commercial Umbrella Liability:

Occurrence Limit:	\$3,000,000
Aggregate Limit (where applicable):	\$3,000,000

Policy to apply excess of the Commercial General Liability (following form Per Project Limit), Commercial Automobile Liability and Employers Liability Coverages.

It is recommended that all Subcontractors and Sub-subcontractors maintain Commercial Umbrella Liability Coverage with Limits of \$2,000,000 Each Occurrence/Aggregate.

§ 11.1.1.5 Deductibles of Self Insured Retentions:

None of the policies of insurance required of the Contractor by this agreement shall contain deductibles or self insured retentions in excess of \$10,000.

§ 11.1.1.6 Reading School District and Consolidated Engineers shall be added as ADDITIONAL INSURED on all liability policies.

§ 11.1.1.7 Contractor's and Subcontractors' insurance is to be endorsed to reflect it is primary and non-contributory for the Owner, and any other additional insured named in these insurance requirements.

§ 11.1.1.8 It is agreed the Contractors' and Subcontractor's insurance will not be canceled, materially changed or non-renewed without at least thirty (30) days advance written notice to the Owner.

§ 11.1.1.9 **Waiver of Rights of Recovery and Waiver of Rights of Subrogation:**The Contractors and Subcontractors waive all rights of recovery against the Owner, and any other additional insured for loss or damage covered by any of the insurance maintained by the Contractor and Subcontractor pursuant to this contract.

If any of the policies of insurance required under the Contract Documents require an endorsement to provide for the waiver of subrogation, then the named insureds of such policies will cause them to be so endorsed.

§ 11.1.1.10 The amount of insurance provided in the aforementioned insurance coverages, shall not be construed to be a limitation of the liability on the part of the Contractors or any of their Subcontractors.

§ 11.1.1.11 Any type of insurance or any increase in limits of liability not described above which the Contractors or Subcontractors require for their own protection or on account of statute shall be the responsibility of the Contractor or any Subcontractor at their sole expense.

§ 11.1.1.12 The carrying of insurance described shall in no way be interpreted as relieving the Contractors or Subcontractors of any responsibility or liability under the contract.

§ 11.1.1.13 Prior to the commencement of work and/or payment, the Contractors and Subcontractors shall file Certificates of Insurance with Owner, which shall be subject to the Owner's approval of adequacy of protection and the satisfactory character of the insurer. The Certificates of Insurance should be mailed within five days of receipt of these insurance requirements to the Owner regardless of when the work will start. Project description and Job Number must be shown on the Certificate of Insurance.

§ 11.1.1.14 In the event of a failure of Contractor to furnish and maintain said insurance and to furnish satisfactory evidence thereof, the Owner shall have the right (but not the obligation) to take out and maintain the same for all parties on behalf of the Contractor who agrees to furnish all necessary information thereof and to pay the cost thereof to the Owner immediately upon presentation of an invoice.

§ 11.1.1.15 **In no event shall the Contractor begin work until a Certificate of Insurance showing coverage in the aforementioned amounts required for the job is received and approved by the Owner. Any work performed without having the Certificate of Insurance received and approved by the Owner is at Contractor's own risk.**

§ 11.1.1.16 The Contractor shall furnish one (1) copy each of Certificate of Insurance herein required for each copy of the Agreement which shall specifically set forth evidence of all coverage required. The form of the Certificate shall be ACORD, Certificate of Liability Insurance. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits.

§ 11.1.2 The insurance required by Article 11 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by Article 11 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations,

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shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.1.5 Property Insurance

§ 11.1.5.1 The Contractor shall purchase and maintain property insurance on an "all risk" basis upon the entire Work at the site to the full insurable value thereof. Such insurance shall be in a company or companies against which the Owner has no reasonable objection. This insurance shall include the interests of Owner, Contractor, Subcontractors, and Sub-subcontractors in the Work and shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief. If not covered under "all risk" insurance or otherwise provided in the Contract Documents, Contractor shall effect and maintain similar property insurance on 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 Payments under Subparagraph 9.3.2.

§ 11.1.5.2 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss. The form of policy of this coverage shall be Completed Value.

§ 11.1.5.3 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order, the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.1.5.4 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.1.5.5 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.1.5.6 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.1.5.7 If mandatory deductibles are required, or if the Contractor should elect, with the concurrence of the Owner, to increase the mandatory deductible amounts of purchase this insurance with voluntary deductible amounts the Contractor shall be responsible for payment of the amount of all deductibles in the event of a paid claim. If separate Contractors are added as insured to be covered by this policy, the separate Contractors shall be responsible for payment of the appropriate part of any deductibles in the event claims are paid on their part of the Project.

§ 11.2 Owner's Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.2.1 Boiler and Machinery Insurance

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

§ 11.6 PERFORMANCE BOND AND PAYMENT BOND

§ 11.6.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract. The Contractor shall provide a performance bond and a labor and material payment bond, each in the amount of 100% of the contract price, before the award of the contract.

§ 11.6.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within the applicable statute of limitations, including discovery rule, after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the statute of limitations, including discovery rule, for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 Any applicable statute of limitations, shall be extended by the amount of time required for correction of Work performed after Substantial Completion.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the 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 the Contractor's obligations other than specifically to correct the Work.

§ 12.2.6 Nothing contained in Paragraph 12.2 shall decrease the responsibilities set forth in the Performance Bond.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

(Paragraph Deleted)

§13.1 GOVERNING LAW

The Contract shall be governed by the law of the Commonwealth of Pennsylvania without regard to its principles of conflicts of law.

§13.1.2 STATUTORY REQUIREMENTS

The Contractor's attention is directed to the fact that all applicable Federal and State laws, local ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Agreement throughout, and shall govern the Work performed pursuant to the Contract Documents, and they are deemed to be included in the Agreement the same as though written therein in full. Owner assumes no liability for or Contractor's failure to adhere to and comply with any and all Federal and State laws, local laws and ordinances, and the rules and regulations of all authorities having jurisdiction over Construction of the Project, including, without limitation, those listed below.

§13.1.3 HUMAN RELATIONS ACT

The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.E. 744) (43 P.S. Section 951, et. seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, familial status, religious creed, ancestry, age, sex, national origin, handicap, disability, or use of guide or support animal, by employers, employment agencies, labor organizations, contractors and others. The Contractor shall agree to comply with the provisions to the Pennsylvania Human Relations Act, as amended from time to time, which is made part of the General Conditions as if included herein at length. The Contractor's attention is directed to the language of the Commonwealth's non-discrimination clause in 16 PA Code 49.101, et seq., as amended from time to time.

§13.1.4 STEEL PRODUCTS PROCUREMENT ACT:

In accordance with Act 3 of the 1978 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the Work, only that produced in the United States, as defined therein, shall be used and supplied in the performance of the Work. Contractor shall strictly comply with all requirements of the Pennsylvania Steel Products Procurement Act, 73 P.S. § 1881 et seq., with respect to the Work, which shall include, without limitation, using steel, steel products (including machinery and equipment) or cast iron produced in the United States unless otherwise exempted therefrom.

In accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States.

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§13.1.5 PREVAILING WAGE ACT

.1 Pennsylvania Prevailing Wage Act (Act No. 442 of 1961, P.L. 987, amended by Act 342 of 1963, P.L. 653), and as amended from time to time (43 P.S. Section 165-1, et seq.). The Pennsylvania Prevailing Wage Act, the regulations thereto, and the Prevailing Minimum Wage Determination Schedule, as determined by the Secretary of Labor and Industry, which shall be paid for each craft or classification of all workers needed to perform the Contract during the anticipated term therefore in the locality in which the Work is performed, are made part of these General Conditions.

- .2 No person shall be employed to Work under this Contract except competent and first-class workers and mechanics. No workers shall be regarded as competent and first-class except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours as established by the Secretary of the Department of Labor and Industry under the "Pennsylvania Prevailing Wage Act" (Act No. 442), effective February 1, 1962, amended by Act 342 of 1963, P.L. 653 and as amended from time to time.

§13.1.6 CRIMINAL HISTORY AND CHILD PROTECTIVE SERVICES INFORMATION

Prior to commencing Work, the Contractor and each Subcontractor shall submit to the Owner on the prescribed form, for each employee or person performing work at the Project site on behalf of the Contractor and any Subcontractor prior to such person performing any work at the Project site, a complete:

- .1 Original report of criminal history record information from the Pennsylvania State Police or a statement from the Pennsylvania State Police that the Pennsylvania State Police central repository contains no such information relating to any of Contractor's employees or its subcontractor's employees working on the Project site prior to such persons performing work at the Project site. Such report of criminal history shall be dated no more than one (1) year prior to the date of execution of this Agreement. To obtain this document, contact the nearest Pennsylvania State Police barracks.
- .2 Copy of the Federal Criminal History record from the Federal Bureau of Investigation in the manner prescribed by the Department of Education. To obtain such a report, contact the nearest FBI Field Office.
- .3 Original background check in accordance with Section 111 of the Public School Code of 1949, Act 34 of March 10, 1949, P.L. 30, No. 14, as amended by from time to time including, without limitation, by Act 114 of July 11, 2006, P.L. 1092, and Act 24 of 2011 (P.L. 112, No. 24) (24 P.S. Section 1-111, et seq.) on the form published by the Pennsylvania Department of Education.
- .4 Official clearance statement obtained from the Pennsylvania Department of Public Welfare pursuant to Act 151 of December 16, 1994 (P.L. 1292), subchapter C.2 of the Child Protective Services Law, as amended from time to time.

§13.1.6.1 The Contractor and its subcontractors shall refuse to employ any person as an independent contractor or employee whose Federal Criminal History record information indicates that such prospective employee has been convicted within five (5) years immediately preceding the date of the report of any of the following offenses:

- .1 An offense under one (1) or more of the following provisions of Title 18 of the Pennsylvania Consolidated Statutes:
 - Chapter 25 (relating to criminal homicide).
 - Section 2702 (relating to aggravated assault).
 - Former section 2709(b) (relating to stalking).
 - Section 2709.1 (relating to stalking).
 - Section 2901 (relating to kidnapping).
 - Section 2902 (relating to unlawful restraint).
 - Section 3121 (relating to rape).
 - Section 3122.1 (relating to statutory sexual assault).
 - Section 3123 (relating to involuntary deviate sexual intercourse).
 - Section 3124.1 (relating to sexual assault).

- Section 3125 (relating to aggravated indecent assault).
 - Section 3126 (relating to indecent assault).
 - Section 3127 (relating to indecent exposure).
 - Section 4302 (relating to incest).
 - Section 4303 (relating to concealing death of child).
 - Section 4304 (relating to endangering welfare of children).
 - Section 4305 (relating to dealing in infant children).
 - A felony offense under Section 5902(b) (relating to prostitution and related offenses).
 - Section 5903(c) or (d) (relating to obscene and other sexual materials and performances).
 - Section 6301 (relating to corruption of minors).
 - Section 6312 (relating to sexual abuse of children).
- .2 An offense designated as a felony under the act of April 14, 1972 (P.L. 233, No. 64), known as "The Controlled Substance, Drug, Device and Cosmetic Act."
- .3 An out-of-State or Federal offense similar in nature to those crimes listed in Paragraphs 13.1.11.5.1 and 13.1.11.5.2.

§13.1.7 COMPETENT WORKMEN

§13.1.7.1 According to Section 752 of the Public School Code of 1949, no person shall be employed to do work under such contract except competent and first class workmen and mechanics.

§13.1.7.2 No workmen shall be regarded as competent first class, within the meaning of this Act, except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages for such hours' work as shall be established and current rates of wages paid for such hours by employers of organized labor in doing similar work in the district where work is being done.

§13.1.8 ANTI-POLLUTION LEGISLATION 62 Pa. C.S.A. Section 3301 requires that Bidders on construction contracts, for the Commonwealth of Pennsylvania be advised that there are provisions of Federal and State statutes, rules and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources that affect the Project on which Bids are being received.

§13.1.8.1 The Bidder shall become thoroughly acquainted with the terms of the listed statutes, rules and regulations, including, but not limited to, Flood Plain Management Act (32 P.S. Section 679.101, et seq.), Water Well Drillers License Act (32 P.S. Section 645.1, et seq.), Pennsylvania Scenic Rivers Act (32 P.S. Section 820.21, et seq.), Dam Safety and Encroachment Act (32 P.S. Sec. 693.1, et seq.), Bluff Recession and Setback Act (32 P.S. Section 5201, et seq.), Storm Water Management Act (32 P.S. Section 680, et seq.), Pennsylvania Sewage Facilities Act (35 P.S. Section 750.1, et seq.), Pennsylvania Solid Waste Management Act (35 P.S. Section 6018.101, et seq.), Pennsylvania Safe Drinking Water Act (35 P.S. Section 721.1, et seq.), the Clean Streams Law (35 P.S. Section 691.901 et seq. and 35 P.S. Section 691.1 et seq.), Air Pollution Control Act (35 P.S. Section 4001, et seq.), Pennsylvania Historic Preservation Act (37 Pa. C.S.A. Section 501, et seq.), Pennsylvania Hazardous Sites Clean Up Act (35 P.S. Section 6020.101, et seq.), Pennsylvania Storage Tank and Spill Prevention Act (35 P.S. Sec. 6021.101, et seq.), Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. Sections 9601-9675) as amended, including, but not limited to, the Superfund Amendments and Reauthorization Act (P.L. 99-499), Federal Solid Waste Disposal Act (42 U.S.C. Sections 6901-6992), Federal Clean Air Act (Air Pollution Act) (42 U.S.C. Sections 7401-7642), Federal Safe Drinking Water Act (See Public Health Service Act Sections 1401-1451) (42 U.S.C. Sections 300f-300j-11), Wild and Scenic River Act (P.L. 90-542), Endangered Species Conservation Act of 1969 (P.L. 89-669), Endangered Species Conservation Act of 1973 (16 U.S.C. Sections 1531-1544), Federal Clean Water Act of 1977 (P.L. 95-217), Rivers and Harbor Act of 1970 (P.L. 91-611), Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Sections 136-136y), Toxic Substance Control Act (15 U.S.C. Sections 2601-2692), Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sections 6901-6991), Coastal Wetlands Planning, Protection and Restoration Act (16 U.S.C. Sections 3951-3956), Coastal Zone Management Act of 1972 (16 U.S.C. Sections 1451-1464), Community Environmental Response Facilitation Act (42 U.S.C. Section 9620), Emergency Planning and Right-to-Know Act of 1986 (42 U.S.C. Sections 11001-11050), Energy Supply and Environmental Coordination Act of 1974 (15 U.S.C. Sections 791-798), Environmental Quality Improvement Act of 1970 (42 U.S.C. Sections 4371-4375), Federal Facility Compliance Act of 1992 (42 U.S.C. Section 6901), Federal Land Policy and Management Act of 1976 (43 U.S.C. Sections 1701-1784), Federal Water Pollution Control Act (33 U.S.C. Sections 1251-1387), Geothermal Energy Research, Development, and Demonstration Act of 1974 (30 U.S.C. Sections 1101-1164), Global Climate Protection Act of 1987 (15 U.S.C. Section 2901 note), Hazardous

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Substance Response Revenue Act of 1980 (see 26 U.S.C. Sections 4611, 4612, 4661, 4662), Lead-Based Paint Exposure Reduction Act (15 U.S.C. Sections 2681-2692), Lead Contamination Control Act of 1988 (42 U.S.C. Sections 300j-21 to 300j-25), Low-Level Radioactive Waste Policy Act (42 U.S.C. Sections 2021b-2021d), National Climate Program Act (15 U.S.C. Sections 2901-2908), National Contaminated Sediment Assessment and Management Act (33 U.S.C. Section 1271 note), National Environmental Policy Act of 1969 (42 U.S.C. Sections 4321-4370b), National Ocean Pollution Planning Act of 1978 (33 U.S.C. Sections 1701-1709), Noise Control Act of 1972 (42 U.S.C. Sections 4901-4918), Oil Pollution Act of 1990 (33 U.S.C. Sections 2701-2761), Pollution Prevention Act of 1990 (42 U.S.C. Sections 13101-13109), Public Health Service Act (42 U.S.C. Sections 300f-300j-11), Renewable Resources Extension Act of 1978 (16 U.S.C. Sections 1671-1676), Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sections 6901-6991), Soil and Water Resources Conservation Act of 1977 (16 U.S.C. Sections 2001-2009), Water Resources Research Act of 1984 (42 U.S.C. Sections 10301-10309), Wood Residue Utilization Act of 1980 (16 U.S.C. Sections 1681-1687), Pennsylvania Worker and Community Right-to-Know Act (35 P.S. Section 7301, et seq.), Asbestos Hazard Emergency Response Act of 1986 (see Toxic Substances Control Act Sections 201-214) (15 U.S.C. Sections 2651-2654), Delaware River Basin Compact (32 P.S. Section 815.101, et seq.), Brandywine River Valley Compact (32 P.S. Section 818, et seq.), Wheeling Creek Watershed Protection and Flood Prevention District Compact (32 P.S. Section 819, et seq.), Susquehanna River Basin Compact (32 P.S. Section 820.1, et seq.), Chesapeake Bay Commission Agreement (32 P.S. Section 820.11, et seq.), Land and Water Conservation and Reclamation Act (32 P.S. Section 5101, et seq.), Wild Resource Conservation Act (32 P.S. Section 5301, et seq.), Cave Protection Act (32 P.S. Section 5601, et seq.), Rails to Trails Act (32 P.S. Section 5611, et seq.), Phosphate Detergent Act (35 P.S. Section 722.1, et seq.), Plumbing System Lead Ban and Notification Act (35 P.S. Section 723.1, et seq.), Publicly Owned Treatment Works Penalty Law (35 P.S. Section 752.1, et seq.), Pennsylvania Solid Waste-Resources Recovery Act (35 P.S. Section 755.1, et seq.), Sewage System Cleaner Control Act (35 P.S. Section 770.01, et seq.), Hazardous Material Emergency Planning and Response Act (35 P.S. Section 6022.101, et seq.), Oil Spill Responder Liability Act (35 P.S. Section 6023.1, et seq.), Land Recycling and Environmental Remediation Standards Act (35 P.S. Section 6026.101, et seq.), Radiation Protection Act (35 P.S. Section 7110.101, et seq.), Low-Level Radioactive Waste Disposal Act (35 P.S. Section 7130.101, et seq.), Pennsylvania Municipalities Planning Code (53 P.S. Section 10101, et seq.), regulations, ordinances, and other actions pursuant to the foregoing, regulations pertaining to Pennsylvania Erosion and Sediment Control, and so on. No separate or additional payment will be made for such compliance. In the event that the listed statutes, rules and regulations are amended, or if new statutes, rules or regulations become effective, after date of receipt of Bids, upon receipt of documentation which causes the Contractor to perform additional Work, the Owner may issue a Change Order setting forth the additional Work that must be undertaken and such additional Work shall be undertaken at no additional cost to the Owner. It is also the responsibility of the Contractor to determine what local ordinances, if any, will affect their portion of the Work. The Contractor shall check for any County, City, Borough or Township rules or regulations applicable to the area in which the Project is being constructed and, in addition, for any rules or regulations of other organizations having jurisdiction, including, without limitation, chambers of commerce, planning commissions, industries or utility companies who have jurisdiction over lands which the Contractor occupies. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

§13.1.9 EROSION CONTROL Contractors performing excavation work shall comply with all rules and regulations of Chapter 102, Title 25 of Pennsylvania Soils Erosion and Sedimentation Control (25 Pa. Code Section 102.1, et seq.). Prior to any grading, the Contractor shall be responsible to obtain approval from the Department of Environmental Protection for an approved sedimentation and erosion control site plan and shall perform all necessary site work in accordance with said plan. The plan shall be available at the site at all times. Contractors performing excavation work shall maintain all devices as required to control erosion caused by storing water and preventing dust and particles from being distributed off site.

§13.1.9.1 ACT NO. 247 provides that if the successful Bidder must undertake additional work due to enactment of new, or the amendment of existing, statutes, rules or regulations occurring after the submission of the successful Bid, the Owner shall issue a Change Order setting forth the additional work that must be undertaken, which shall not invalidate the Contract. The cost of such a Change Order to the Owner shall be determined in accordance with the provisions of the Contract for change orders or force accounts or, if no such provision is set for the in the Contract, then the cost to the Owner shall be the Contractor's cost for wages, labor costs other than wages, wage taxes, materials, equipment rentals, insurance and subcontracts attributable to the additional activity plus a reasonable sum for overhead and profit; provided, however, that such additional costs to undertake the work not specified in the Invitation for Bids shall not be approved unless written authorization is given to the successful Bidder prior to his

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undertaking such additional activity. In the event of a dispute between the Owner and the successful Bidder, arbitration procedures may be commenced under Article 7 of the General Conditions.

§13.1.10 DEMOLITION All demolition work shall be performed in accordance with the regulations of the Pennsylvania Code, Chapter 5 and Subchapter B – Demolition Work.

§13.1.11 DISCRIMINATION Each Contract entered into by a governmental agency for the construction, alteration or repair of any public building or public work shall contain the following provisions by which the Contractor agrees:

.1 In the hiring of any employees for the manufacturer of supplies, performance of the Work, or any other activity required under the Contract or any subcontract, the Contractor, Subcontractor, or any person acting on behalf of the Contractor or Subcontractor shall not, by reason of gender, race, creed, or color, discriminate against any citizen of the Commonwealth of Pennsylvania who is qualified and available to perform the Work to which the employment relates. (62 Pa. C.S.A. Section 3701).

.2 Neither the Contractor nor any Subcontractor nor any person on their behalf shall in any manner discriminate against or intimidate any employee involved in the manufacturer of supplies, the performance of Work, or any other activity required under the Contract on account of gender, race, creed, or color. (62 Pa. C.S.A. Section 3701).

.3 Contractors and Subcontractors shall establish and maintain a written sexual harassment policy and shall inform their employees of the policy. The policy must contain a notice that sexual harassment will not be tolerated and employees who practice it will be disciplined.

.4 Contractors shall not discriminate by reason of gender, race, creed, or color against any Subcontractor or supplier who is qualified to perform the Work to which the Contracts relates.

.5 Contractors and each Subcontractor shall furnish necessary employment documents and records to and permit access to their books, records, and accounts by the contracting agency and the Bureau of Contract Administration and Business Development, for purposes of investigation, to ascertain compliance with provisions of this Paragraph. If the Contractor or any Subcontractor does not possess documents or records reflecting the necessary information requested, the Contractor or Subcontractor shall furnish such information on reporting forms supplied by the contracting agency or the Bureau of Contract Administration and Business Development.

.6 The Contractor shall include, without limitation, the provisions of this Paragraph in every subcontract so that such provisions will be binding, upon each Subcontractor.

.7 The Commonwealth of Pennsylvania may cancel or terminate the Contract and all money due or to become due under the Contract may be forfeited for a violation of the terms and conditions of this Paragraph. In addition, the agency may proceed with debarment or suspension and may place the Contractor in the contractor responsibility file.

§13.1.12 TAX EXEMPTION Bid price shall not include taxes for which the Owner is exempt.

§13.2 PROHIBITION ON CASH ALLOWANCES Any reference that implies the presence of cash allowances must be deleted. Cash Allowances are prohibited.

§13.3 STANDARD OF QUALITY The various materials and products specified in the specifications by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the bidder, the bid or the evaluation of the bid to any one material or product specified but rather to describe the minimum standard. When proprietary names are used, they shall be followed by the words "or alternatives of the quality necessary to meet the specifications". A bid containing an alternative which does not meet the specifications may be declared non-responsive. A bid containing an alternative may be accepted but, if an award is made to that bidder, the bidder will be required to replace any alternatives which do not meet the specifications.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such

procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Paragraph Deleted)

§ 13.6 SUCCESSORS AND ASSIGNS

§ 13.6.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

(Paragraph Deleted)

§ 13.6.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.7 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.8 RIGHTS AND REMEDIES

§ 13.8.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.8.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 If the Work is stopped for a period of 60 consecutive days under any final, non-appealable order of any court or other public authority having jurisdiction, through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons or entities performing portions of the Work under the Contract with the Contractor, then the Contractor may, upon fourteen (14) days written notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for all Work properly executed in accordance with the requirements of the Contract Documents. In such event, the Contractor shall be entitled to payment for Work performed at the Project site only. This is the Contractor's sole remedy. If the Contractor challenges termination, the Contractor will forfeit its right to recover payment under this Paragraph 14.1.1 and will be responsible for all of the Owner's costs including, but not limited to, legal fees, professional fees and other expenses and costs.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise materially breaches a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment.

§ 14.2.4 If the costs of finishing the Work, including compensation for the Architect's services and expenses made necessary by the termination, and other damages incurred by the Owner exceed the unpaid balance, the Contractor shall pay the difference to the Owner immediately upon demand by the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

The costs of finishing the Work shall include, but not be limited to, all reasonable legal fees, professional fees, additional title costs, insurance, additional interest because of any delay in completing the Work, and all other direct and indirect consequential and/or incidental costs incurred by the Owner by reason of the termination of the Contractor as stated herein.

§ 14.2.5 In the event the Owner elects to terminate the Contractor for cause, the Owner may recover against the Contractor and Surety as part of its damages any and all legal fees, professional fees, jointly and severally, including, but not limited to, architectural fees, construction management fees, legal fees, and all other costs and expenses related thereto. The Owner shall have the right to set off said amounts against any amount alleged to be due and owing to the Contractor on the base amount of the Contract. Further, should the Contractor fail to achieve Final Completion promptly, upon written recommendation by the Architect and upon notice to the Contractor and

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after reasonable opportunity to cure, the Owner may, for cause, terminate the Contractor, complete the Work, and recover against the Contractor or Surety, any and all amounts that the Owner incurs, including, but not limited to, any and all legal fees, professional fees and all other costs and expenses related thereto.

§ 14.2.6 In the event that the Owner declares the Contractor in default and the Contractor's Surety fails to adhere to its obligations under the Performance Bond and Payment Bond, the Surety shall be liable to the Owner for any and all damages that the Owner incurs including, but not limited to, any legal fees, professional fees, or other costs or expenses incurred by the Owner in connection with the Owner's pursuit of its rights under the Performance Bond, Payment Bond and/or applicable law, including, but not limited to, the cost of all litigation, legal fees, professional fees, and all other costs and expenses.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine. In such event, if applicable, the Contractor shall be entitled to an extension of the Contract Time pursuant to Paragraph 8.3.1; provided, however, the Contractor shall not be entitled to any adjustment of the Contract Sum.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment from the Owner for Work performed by the Contractor in accordance with the Contract Documents (including reasonable overhead and profit on such Work performed). The Contractor shall not be entitled to receive any other compensation, including, without limitation, for field and office overhead or profit (e.g. expected or actual profit), termination expenses or damages.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

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§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by the Contractor must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later.

(Paragraph Deleted)

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

(Paragraph Deleted)

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction, during such abnormal period of time, and will have an unavoidable and material effect on the overall construction.

§ 15.1.6.3 Construction Acceleration Claims

No claim for an increase in the Contract Sum or change in the Contract Time shall be based on construction acceleration. Accordingly, no course of conduct or dealings between the parties, or any express or implied statements made by the parties, nor any express or implied acceptance of alterations to the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work, whether or not there is in fact any such unjust enrichment, shall be the basis for any claim to an increase in the Contract Sum or change in the Contract Time.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor waives claims against the Owner for consequential and/or incidental damages arising out of or relating to this Contract. This waiver includes, but is not limited to:

- .1 Consequential damages incurred by the Contractor for principal office expenses including, but not limited to, the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of actual and expected profits.
- .2 Incidental damages incurred by the Contractor including, but not limited to, costs resulting from stopping the Work, removing and transporting the Contractor's property (e.g., the Contractor's equipment, supplies and materials), and storing the Contractor's property (e.g., the Contractor's equipment, supplies and materials) at an alternate location.

This waiver is applicable, without limitation, to all consequential and/or incidental damages, due to either the Contractor and/or the Owner's termination in accordance with Article 14. Notwithstanding anything else to the contrary in the Contract Documents, the Owner shall have the right to recover consequential damages and/or incidental damages from the Contractor to the extent permitted by law.

§ 15.1.8 Claims for Economic Loss

The Contractor shall have no claim or right of recovery of damages against the Owner and/or the Architect for

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economic loss sustained, in whole or in part, by any act or omission of the Owner and/or the Architect to the extent that such act or omission constitutes a breach of contract. Specifically, and without limiting the generality of the foregoing, the Contractor shall have no claim against the Owner or the Architect for economic loss based upon any tort, including, without limitation, negligence, negligent misrepresentation or any other tort-based theory of liability.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both.

§ 15.2.6 When a written decision of the Architect states that (1) the decision is final but subject to mediation and/or litigation and (2) filing of mediation and/or a lawsuit covered by such decision must be made by the

Contractor within thirty (30) days after the date on which the Contractor receives the final written initial decision, then the Contractor's failure to file mediation and/or a lawsuit within said thirty (30) days' period shall result in the Architect's decision becoming final and binding upon the Contractor and the Contractor shall have waived its right to mediate and/or litigate any subject matter addressed in such initial decision. In the event the Contractor attempts to pursue mediation or litigation of such subject matter, the Contractor shall reimburse the Owner, within thirty days of demand, all fees and costs incurred by the Owner, including, without limitation, attorneys' fees, in connection therewith.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the Berks County Bar Association in accordance with its rules in effect on the date of the filing of mediation. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

§ 15.3.3

The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

(Paragraph Deleted)

§15.3.4 To the extent either the Owner or the Contractor pursues a Claim or otherwise commences litigation in connection with this Contract and the Owner prevails, partially or completely, on any or all of its own Claims or leaves the Contractor with less than one hundred percent (100%) recovery of the maximum amount claimed due to the Contractor during the resolution process of such Claim or litigation, the Contractor shall be liable for any and all legal fees, professional fees, costs or expenses of the Owner, as well as the true cost of any of the Owner's employees' time, associated with analyzing any Claim, pursuing litigation or defending the Claim or litigation. The Owner may (a) deduct such legal fees, professional fees, costs and expenses from any amounts otherwise due to the Contractor under

(Paragraph Deleted)

the Contract, to the extent available or (b) submit an invoice to the Contractor identifying such amounts due and the Contractor shall immediately reimburse the Owner for such amount upon receipt of the invoice.

Additions and Deletions Report for **AIA® Document A201® – 2017**

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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PAGE 1

for the following PROJECT:

...

Admin HVAC Phase II (Floors 1 and 2 and Basement) Project

...

Reading School District 800 Washington Street
Reading, PA 19601

...

THE ARCHITECT:ARCHITECT/ENGINEER (hereinafter and for purposes of this document and the contract documents, the "Architect"):

...

Consolidated Engineers 1022 James Drive
Leesport, PA 19533

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15 CLAIMS AND DISPUTES

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ARTICLE 1 GENERAL PROVISIONS

...

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. ~~Unless specifically enumerated in the Agreement, the~~

Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

...

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

...

Contractor acknowledges and warrants that it has closely examined all of the Contract Documents, that they are suitable and sufficient to enable the Contractor to complete the Work in a timely manner for the Contract Sum, and that they include all Work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in full compliance with all applicable standards, codes, laws, ordinances, regulations and/or requirements of any state, federal or other governmental agency.

...

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

...

The Drawings are diagrammatical and show the general arrangement and extent of the Work; exact locations and arrangements of parts shall be determined as the Work progresses and shall be subject to the Architect's approval. No extra compensation will be allowed due to conflicts, inconsistencies, or discrepancies between actual dimensions and those indicated. The right is reserved by the Architect to make any reasonable change in location of equipment, ductwork and piping, prior to roughing in without involving additional compensation to the Contractor

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The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. ~~The parties will use AIA Document E203™ 2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.~~

...

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model ~~and without having those protocols set forth in AIA Document E203™ 2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™ 2013, Project Building Information Modeling Protocol Form,~~ shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

...

~~§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located,~~

usually referred to as the site, and the Owner's interest therein. The designation "Owner" in the Contract Documents shall refer to Reading School District, 800 Washington Street, Reading, Pennsylvania, 19601, for the construction work in Berks County known as: "Admin HVAC Phase II (Floors 1 and 2 and Basement) Project"

...

§ 2.2 Evidence of the Owner's Financial Arrangements

...

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately. The Owner's Representative shall be Mr. Dennis Campbell, Facilities/Construction, for Reading School District.

...

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents. 2.1.2 The Owner has engaged a Project Representative, Fidevia LLC, Lititz Pike, Lititz, Pennsylvania, (Fidevia) to oversee and represent its interests throughout the duration of the Project. The Contractor shall reasonably cooperate with the instruction provided by

...

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

...

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information. Project Representative. Provided, however, such Project Representative shall not have the authority to bind the Owner.

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§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of

information furnished by the Owner but shall exercise proper precautions relating to the safe not be responsible for furnishing surveys (unless required for the execution of the Work and requested by the Contractor in writing) or other information as to the physical characteristics of, legal limitations of or utility locations for the Project site which shall not constitute one of the Contract Documents. The Contractor represents that it is familiar with the Project site and has received all information it needs concerning the condition of the Project site. The Contractor represents that it has inspected the locations of the Work and has satisfied itself as to the condition thereof, including, without limitation, all structural, surface and reasonably ascertainable subsurface conditions. Based upon the foregoing inspections, understandings, agreements and acknowledgements, the Contractor agrees and acknowledges (1) that the Contract Sum is just and reasonable compensation for all Work, including foreseen and foreseeable risks, hazards and difficulties in connection therewith, and (2) that the Contract Time is adequate for the performance of the Work.

...

The Contractor shall have no claims for surface or reasonably ascertainable subsurface conditions encountered. The Contractor shall exercise special care in executing subsurface Work in proximity of known subsurface utilities, improvements, and easements.

...

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. ~~Such action by the Owner and amounts charged to~~

...

~~the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for~~ In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

...

~~the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15. In no event shall the Owner, Project Representative, or Architect have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents. Hence, the Owner and Contractor hereby acknowledge and agree that the Owner has retained the Contractor as an independent contractor to perform the Work on the Project. It is expressly understood and agreed that the presence on the jobsite of the Owner's visiting officers or employees, the Owner, Project Representative, and Architect or supervisory personnel employed by Owner and the making by such personnel of any inspections of the Contractor's Work, materials, tools or equipment, or of the finished Work of the Contractor and their approval of same, or failure to take exception thereto, shall in no way relieve the Contractor from its absolute responsibility to perform its Work and furnish its materials in accordance with the requirements of the Contract Documents. Any failure by the Owner, Project Representative, or Architect to take exception to any Work of the Contractor shall not constitute a ratification or approval of the Work or work methods employed by the Contractor if the same did not in fact comply with the requirements of the Contract Documents.~~

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§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. ~~If the Contractor performs these obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for noneonformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.~~

...

§ 3.3.1.1 The Contractor is to appoint by written commitment a single representative on site who has the authority to act on behalf of the Contractor and its Subcontractors and suppliers.

...

§ 3.3.1.2 At any time within the Construction Period, the Owner and Architect shall have the right and the authority to require the replacement of the Contractor's Project Manager, Superintendent, or Foreman.

...

§ 3.3.1.3 The Architect shall have the authority to direct the Contractor to assign additional supervisory personnel to ensure compliance with the schedule and quality requirements at no addition to the Contract Sum.

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§ 3.3.1.3.1 When the Work is being performed at different locations of the Project site, supervision must be assigned to each location where Work is being performed. When extended hours are required to maintain the progress schedule, such as multiple shifts and/or additional work days, adequate supervision shall be required of the Contractor during these times. The competence level and ability of supervisory personnel must be adequate to perform the Work.

...

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors. After Award of Contract, any claims for additional costs associated with completion of the Work within the required Contract time frames will not be considered. Contractors who feel extra time, in any form such as shift work, overtime, and premium time, is necessary to meet Contract requirements regardless of trade, should include these costs in their bids.

...

§ 3.3.4 The Contractor's supervision of work shall include expediting and coordination of work of trades. The Contractor shall perform all supervising and procuring required to ensure delivery of materials to maintain work schedules of sub-contractors and progress schedules of the Project to ensure full completion of work, to supply equipment or instruments necessary to complete specified test, checks, balancing of system, and to furnish operating instructions, etc.

...

§ 3.3.5 The Contractor, its employees or its subcontractors shall not install any product or equipment in a manner which is in conflict with the manufacturer's recommendations. If the manufacturer of the product or equipment has requirements which cannot be met by the specific application indicated, the Contractor shall bring this information to the attention of the Architect. Products or equipment installed contrary to the manufacturers' requirements shall be replaced at no additional cost to the Owner unless specifically authorized in writing by the Architect.

...

§ 3.3.6 The Contractor's representatives shall be capable of providing intelligent and efficient supervision, coordination and scheduling through all phases of the Work.

...

§ 3.3.7 No alleged verbal agreement or conversation with any officer, agent, or employee of the Owner, Project Representative, or Architect, either before or after the execution of the Contract, shall affect or modify the terms or obligations contained in the Contract Documents. Failure to comply with any or all of the above requirements will not relieve the Contractor from the responsibility of properly estimating the difficulty or cost of successful completion of the Work, nor from the responsibility for the faithful performance of the provisions of the Agreement and in accordance with the Contract Documents. Modifications or changes may be made in writing only. This requirement may not be waived under any circumstances.

...

§ 3.3.8 The Contractor has reviewed the completion dates and times set forth in the Contract Documents, agrees that such dates and times are reasonable and commits to achieve them. The Contract Sum includes costs associated with completion by those dates and times, including, but not limited to, costs associated with out-of-sequence work, come-back work, stand-by work, stacking of trades, coordination with the schedules and work of separate contractors, allowing sufficient time, work and storage areas, and site access for separate contractors to timely progress and complete their work, overtime, expediting and acceleration that may be required to complete the Work by those dates and times.

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§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. Contractor shall pay Architect and the Project Representative directly for any costs associated with reviewing substitution requests and revising the drawings and specifications as a result of any substitution requests.

...

§ 3.4.3.1 Workers shall not smoke within the limits of the Owner's property boundaries or as otherwise required by Federal legislation, Title X, P.L. 103-227, Goal 2000, Educate America Act of 1994 as amended from time to time, including without limitation, 20 U.S.C.A. Section 6081, et seq., the Pro-Children Act of 1994. Nothing in the Educate America Act of 1994 or the codification of same in the Pro-Children Act of 1994 shall preempt any provision of law of a state or political subdivision of a state that is more restrictive. Workers shall not possess or consume alcoholic beverages when within the limits of the Owner's property boundaries. The Contractor shall require its employees and agents, and its Subcontractor's employees and agents to work diligently and behave in an orderly manner at all times when at or about the Project site and shall remove from the Project any employee

whose conduct is deemed objectionable. Unless otherwise approved by the Owner, persons performing Work shall not use the Owner's building facilities, including, without limitation, restroom facilities.

...

§ 3.4.4 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). Substitutions for materials, methods, assemblies, or products, required to achieve a bona fide bid, must be submitted to the Architect ten (10) days prior to the bid submission due date, and be approved by the Architect prior to acceptance of the construction bid.

...

§ 3.4.5 By making requests for substitutions based on Subparagraph 3.4.4 above, the Contractor:

...

.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

...

.2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

...

.3 certified that the cost data presented is complete and includes all related costs under this Contract, except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

...

.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

...

.5 represents that, in the event incorporation of a substituted item or assembly into the Work will require revisions or additions to the Work of other construction contracts, the Contractor proposing to use such substituted materials, products, or assembly will bear the cost of such revisions or additions at no charge in the Contract Sum.

...

§ 3.4.6 Discrimination - The Contractor shall agree:

...

.1 That in the hiring of employees for the performance of the Work under the Contract Documents, or for any subcontract thereunder, no Contractor, Subcontractor nor any person acting on behalf of such Contractor or Subcontractor, shall, by reason of gender, race, creed, or color, discriminate against any citizen of the Commonwealth of Pennsylvania who is qualified and available to perform the Work to which the employment relates;

...

.2 That no Contractor, Subcontractor, nor any person on his behalf shall in any manner discriminate against or intimidate any employee hired for the performance of the Work on account of gender, race, creed or color;

...

.3 The Contractor and Subcontractors shall establish and maintain a written sexual harassment policy and shall inform their employees of the policy. The policy must contain a notice that sexual harassment will not be tolerated and employees violating the policy will be disciplined.

...

.4 The Contractor shall not discriminate by reason of gender, race, creed or color against any Subcontractor or supplier who is qualified to perform the Work.

...

.5 The Contractor and each Subcontractor shall furnish necessary employment documents and records, and shall permit access to, to their books, records and accounts for the purpose of any investigation involving compliance with Section 3.4.6.

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.6 The Contractor shall include, without limitation, the provisions of Section 3.4.6 in every subcontract so that such provisions will be binding upon each subcontractor.

...

.7 The Owner may cancel or terminate the Contract for violation of the terms of Section 3.4.6, and, in the event of such termination, all money due or to become due under the Contract Documents may be forfeited.

...

§ 3.4.7 Owner specifically reserves the right to reject any person Owner deems unfit to be permitted on school grounds and in proximity to students. Upon written notice from Owner, Contractor shall have all such persons removed from the Project. Owner's right to declare such person unfit shall not be limited to the required exclusion of persons from school property as set forth in Section 10111 of the Pennsylvania Public School Code and/or Subchapter C.2 of the Child Protective Services Law.

...

§ 3.4.8 Work specified which becomes impossible due to strike, loss of plant through fire or flood, bankruptcy, or other unforeseeable cause beyond Contractor's control, shall be substituted equally from another source subject to substitution procedures in the Contract Documents. Substitute work shall not entitle the Contractor to either an increase in cost or an extension of contract time. Notwithstanding the same, if the substitute work results in a savings to Contractor, Owner shall be entitled to a reduction in the Contract Sum. In any event, substitute work shall be incorporated into the Project through a properly executed Change Order.

...

.1 Items not ordered by the Contractor in a timely manner for incorporation into the Work will not entitle

the Contractor for additional time or compensation.

...

.2 Substitute work offered and approved shall not be a basis for contingent extra charges or additional charges due to changes in related work, such as rough-in, changes in supporting foundations, and other related work.

...

.3 The Contractor shall assume full responsibility for adequacy of substitute work.

...

§ 3.4.9 Whether indicated or not, all materials on the Project shall be asbestos-free and lead-free. If any suspected asbestos-containing or lead-containing materials are installed, the Owner has the right to have the material in question tested and if proven to contain asbestos or lead, the Contractor shall remove all material in question and replace it with acceptable material at no additional cost to the Owner.

...

§ 3.4.10 Competent Workmen: As set forth more fully in Section 13, no person shall be employed to do Work under such Contract except competent and first class workmen and mechanics. No workmen shall be regarded as competent first class, except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours' Work as shall be established and current rates of wages paid for such hours by employers of organized labor in doing of similar Work in the District where Work is being done.

...

§ 3.4.11 The Contractor shall not employ workers, materials or equipment which may cause strikes, work stoppages or any disturbances by workers employed by the Contractor or the Owner or other Contractors or Subcontractors in connection with the Work of the Project or the location thereof. The Contractor agrees that all disputes as to jurisdiction of trades shall be adjusted in accordance with any plan for the settlement of jurisdictional disputes which may be in effect either nationally or in the locality in which the Work is being performed and that is shall be bound and abided by such adjustments and settlements of jurisdictional disputes, provided that the provisions of this Article shall not be in violation of or in conflict with any provisions of law applicable to the settlement of such disputes. Should the Contractor fail to carry out or comply with any of the foregoing provisions, the Owner shall have the right, in addition to any other rights and remedies provided by the Contract Documents or by law, after three day's written notice mailed or delivered to the latest known address of the Contractor, for all or any portion of the Work, and, for the purpose of completing the Work, to enter upon the premises and take possession, in the same manner, to the extent and upon the same Terms and Conditions as set forth in Paragraph 14.2.

...

§ 3.4.11.1 The Contractor shall remove from the Project such employees of the Contractor or of any Subcontractor as the owner requests be removed, with or without reason.

...

§ 3.4.12 The Contractor in making or ordering material shipments shall not consign or have consigned materials, equipment or any other items in the name of the Owner. The Owner shall not be under any obligation to make payment for charges or deposits on shipments made by or to the Contractor but may, at its option, pay such charges

in which case the Contractor shall reimburse the Owner for the amount of such payments plus a service charge of twenty-five percent (25%) of the amount so paid.

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§ 3.4.13 Contract Sum Not Adjusted for Rising Costs: The Bid (and hence the Contract Sum) for the Contract must be guaranteed for the duration of the Project and shall thereby have incorporated within it any or all escalation factors related to market conditions. Notwithstanding any other provision in the Contract Documents to the contrary, Contractor's Contract Sum is intended to include all increases in cost, foreseen or unforeseen, including, without limitation, increases in costs arising from supply shortages, unusual delay in deliveries, increases in market prices for materials, labor, taxes and/or other causes beyond the Owner's control, all of which are to be borne solely by the Contractor supplying the materials and/or labor to the Project. All loss and/or damage arising from any of the Work performed under this Agreement through unforeseen or unusual obstructions, difficulties or delays which may be encountered in the prosecution of same shall be borne solely by the Contractor prosecuting the Work.

...

§ 3.6.1 The Contractor hereby accepts and assumes full and exclusive liability for payment of all sales taxes, state and municipal taxes including, without limitation, business privilege taxes, use taxes, and all contributions and payroll taxes under the provisions of Federal law or the laws of the Commonwealth of Pennsylvania, including, but not limited to, Social Security Acts, as to all employees engaged in the performance of the Work subject to the Contract Documents, and further agrees to meet all requirements that may be specified under regulations of government officials having jurisdiction over the Work. All sales taxes, state and municipal taxes, business privilege taxes and use taxes are expressly included within the compensation owed to the Contractor under the terms of the Contract Documents. It is further agreed that the Owner shall have the right to deduct the amount of any and all such taxes from the compensation owed to the Contractor under the terms of the Contract Documents at any time, in the Owner's sole discretion, as the Owner deems advisable, it being agreed that the Owner shall have the right to deduct any and all such moneys from the next payments due under the Contract Documents and from the retained percentages.

...

§ 3.6.2 The Contractor hereby accepts and assumes full and exclusive liability for and shall indemnify, protect and save harmless the Architect and Owner from and against the payment of:

...

.1 All contributions, taxes or premiums (including, without limitation, interest and penalties thereon) which may be payable under any unemployment insurance laws of any state, the Older Workers Benefit Protection Act of 1990 (OWBPA) (P.L. 101-433, October 16, 1990, 104 Stat. 978), as amended from time to time, the Federal Social Security Act, as amended from time to time, Federal, State, County and/or Municipal tax withholding laws, or any other laws, measured upon the payroll of or required to be withheld from employees, by whomever employed, engaged in the Work.

...

.2 All sales, use, personal property and other taxes (including, without limitation, interest and penalties thereon) required by any Federal, State, County, Municipal or any other laws to be paid or collected by the Contractor or any of its Subcontractors or vendors or any other person acting for, through or under it or any of them by reason of the performance of the Work or the acquisition, ownership, furnishing or use of any materials, equipment, supplies, labor, services or other items for or in connection with the Work.

.3 All pension, welfare, vacation, annuity and other union benefit contributions payable under or in connection with labor agreements with respect to all persons, by whomsoever employed, engaged in the Work.

...

.4 In the event that any law is or has been passed, or any rule or regulation pursuant thereof is enacted, which requires the Owner to pay, either directly or indirectly, the amount of any such sales, use, personal property and other taxes (including, without limitation, interest and penalties thereon) required by any Federal, State, County, Municipal or any other laws or should any such law, rule or regulation direct the Owner to collect the same, or make the Owner liable for the collection thereof, or make the Owner responsible therefor, it is covenanted and agreed that the Contractor shall fully and completely make all payments therefor, and shall fully and completely indemnify and save the Owner harmless from any and all such taxes.

...

§ 3.6.3 The Contractor represents that it based its Bid on the properly charged, collected and remitted sales tax due on only those "construction activities" which are presumed to become a permanent part of the real estate in accordance with 61 Pa. Code Section 31.11, et seq., as amended from time to time. The Contractor shall not include in its Bid any tax for "sales activities" which do not become a permanent part of the real estate in accordance with 61 Pa. Code Section § 31.11, et seq., as amended from time to time.

...

§ 3.6.4 The Contractor shall keep detailed records of all materials, equipment and labor furnished in connection with the Work and shall keep such full and detailed accounts as may be necessary for the proper financial management under the Contract Documents and the system utilized by the Contractor shall be satisfactory to the Owner. The Owner or its representative shall be afforded access to the Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, certifications and similar data relating to the Contract Documents. Further, the Owner or its representative shall have the authority, but not the obligation, to require the Contractor to provide the Owner with certified payroll records for the labor furnished by the Contractor in connection with the Work.

...

§ 3.6.4.1 The Contractor shall preserve all such records for a period of three (3) years, or for such longer period as may be required by law, after final payment. To the extent requested by Owner, copies of such records will be provided by the Contractor. Also, the Contractor shall immediately transmit to the Owner copies of all invoices and receipts for materials, equipment and labor furnished in connection with the Work by the Contractor and any other materials that reflect sales and use tax paid or not paid.

...

§ 3.6.5 The Contractor agrees to assign and transfer to the Owner all of its rights to sales and use tax which may be refunded as a result of a claim for refund for materials and/or equipment purchased for the Project. The Contractor further agrees that it will not file a claim for refund for any sales or use tax which is the subject of this assignment. This assignment will include, without limitation, any tax erroneously paid by the Contractor. Further, the Contractor agrees to execute all such documents as may be necessary to effectuate such an assignment.

...

§ 3.7.2.1 The Contractors shall comply with all aspects of the Federal Occupational Safety and Health Act of 1970 (OSHA) and all up to date amendments thereto, including specific responsibilities to perform reporting and recording requirements. The Contractor is responsible to obtain information regarding its responsibilities under the Act.

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§ 3.7.2.2 The Contractor shall comply with all aspects of Pennsylvania Act 287 of 1994, as amended by Act 187 of 1996 and OSHA § 1926.651 requiring, among others, contractors intending to perform excavation or demolition work in a site within a political subdivision, to ascertain the location and type of utility lines and pipes at each site and to notify the utility company or companies not less than three (3) working days in advance of performing the excavation or demolition. Call Pennsylvania One Call System, Inc., (1.800.242.1776) or contact them at (www.paonecall.org)

...

§ 3.7.2.3 The Contractors at all times shall observe and comply with all Federal and State Laws and local ordinances and regulations in any manner affecting the conduct of the Work and all such orders or decrees as exist at present and those which may be enacted later by bodies or tribunals having jurisdiction or authority over the Work and shall indemnify and hold harmless the Owner and all his officers, agents and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees, agents or anyone acting on behalf of the Contractor. If the Contractor, any of its Subcontractors or any Sub-Subcontractors, performs Work contrary to laws, statutes, ordinances, building codes, and rules and regulations, the Contractor shall assume full responsibility for such Work and shall bear all costs required to bring the Work into compliance with laws, including any fines or penalties resulting from such non-compliance.

...

§ 3.7.2.4 Each and every provision of law and clause required by law to be included in the Contract Documents shall be deemed to be inserted therein and the Contract Documents shall be read and enforced as though they were included herein, and if through mistake or otherwise, such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

...

§ 3.7.2.5 It is the responsibility of the Contractor to determine what local ordinances, if any, will affect the Work. The Contractor shall check for any County, City, Borough, or Township rules or regulations applicable to the areas in which the Project is being constructed and in addition, the Contractor shall check for any rules or regulations of other organizations having jurisdiction, including, but not limited to, chambers-of-commerce, industries, or utility companies who have jurisdiction over lands which the Contractor furnishes materials, equipment and labor in connection with the Work. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

...

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly

provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 44-7 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

...

~~§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.~~
NO CASH ALLOWANCES

PAGE 20

~~§ 3.8.2 Unless otherwise provided in the Contract Documents,~~

...

~~.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;~~

...

~~.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and~~

...

~~.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.~~

PAGE 21

~~§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.~~

PAGE 22

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless and defend, immediately upon demand, the Owner, Architect, Architect's consultants, and agents and employees of any of them (the "Indemnified Parties") from and against claims, damages, losses, losses and expenses, including but not limited to attorneys' fees, fees and defense costs, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to any person, including, without limitation, Contractor's or any Subcontractor's employees, or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, loss or expense is caused in part by a party indemnified hereunder, an Indemnified Party. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

...

In the event that any such claim, loss, cost, expense, liability, damage or injury arises or is made, asserted or threatened against the Owner for which the Contractor or its insurer does not admit coverage, or if the Owner reasonably determines such coverage to be inadequate, the Owner shall have the right to withhold from Contractor any payments due or to become due to the Contractor in an amount sufficient to protect the Owner from such claim, loss, cost, expense, liability, damage or injury, including, but not limited to, legal fees and expenses reasonably necessary for the defense thereof.

PAGE 23

§ 3.18.3 In the event that the Contractor is requested but refuses to honor the indemnity obligations hereunder, then the Contractor shall, in addition to all other obligations, pay the costs and fees, including, without limitation, attorneys' fees, incurred by an Indemnified Party to enforce the indemnity obligations hereunder. Furthermore, the Contractor shall be solely responsible for all legal fees incurred by the Owner in defending, removing, marking satisfied mechanics' liens or any other expenses incurred by Owner in connection with mechanics' lien claims and/or judgments.

...

§ 3.19 REPRESENTATIONS AND WARRANTIES

...

§ 3.19.1 Contractor shall be responsible for preparing and completing its own comprehensive list of items to be completed or corrected (punch-list) in order to submit for Substantial Completion. If after the punch-list is submitted and upon inspection, it is found that a Contractor's punch-list is incomplete, lengthy or ill prepared, the Substantial Completion request will be denied. If the Contractor's incomplete, lengthy or ill prepared punch-list or the Contractor's inability to complete its punch list and, therefore, complete the Contract, causes the Architect to prepare a punch list, the Contractor will be solely responsible for the direct payment to the Architect of the Architect's fees incurred in preparing the punch-list.

...

In the event the Contractor or its Subcontractor fails to complete these punch-lists, the Owner may: (i) exercise any available remedies under this Agreement, at law, and/or at equity to correct or complete deficient Work or retain a third party to correct or complete such Work at the cost of the defaulting Contractor; and (ii) retain and deduct from any payments or retention otherwise due to the defaulting Contractor any fees and expenses for services required to be provided to correct or complete such deficient Work. The Architect and/or any of its consultants or

representatives and/or the Owner will be compensated for such additional work at standard prevailing rates by the Contractor.

...

The Contractor represents and warrants the following to the Owner (in addition to the other representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute this Agreement, which representations and warranties shall survive the execution and delivery of this Agreement and the Final Completion of the Work:

...

.1 that it is financially solvent, able to pay its debts as they mature and possess sufficient working capital to complete the Work and perform its obligations under the Contract Documents;

...

.2 that it is able to furnish the personnel, tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder and has sufficient experience and competence to do so;

...

.3 that it is authorized to do business in the Commonwealth of Pennsylvania and is properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over it and over the Work for the Project;

...

.4 that its execution of this Agreement and its performance thereof is within its duly authorized powers;

...

.5 that it is familiar with all applicable laws, ordinances and regulations, which may in any way affect the Work of those employed herein, including, but not limited to, any special acts relating to the Work or to the Project of which it is a part;

...

.6 that such temporary and permanent Work required by the Contract Documents as is to be done by it, can be satisfactorily constructed and used for the purposes for which it is intended, and that such construction will not injure any person or damage any property;

...

.7 that it is familiar with local trade jurisdictional practices;

...

.8 that it has carefully examined the Plans, the Specifications and the Project site for the Work, and that, from its own investigation, it has satisfied itself as to the nature and location of the Work, the character, quality and quantity of the surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the Work, and the general local conditions, and all other materials which may in any way affect the Work or its performance; and

...
.9 that it has determined what local ordinances, if any, will affect its Work. The Contractor has checked for any County, City, Borough, or Township rules or regulations applicable to the area in which the Project is being constructed and in addition, the Contractor has checked for any rules or regulations of other organizations having jurisdiction, including, but not limited to, such as chambers-of-commerce, planning commission, industries, or utility companies who have jurisdiction over lands which the Contractor occupies. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

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§ 3.20 The Contractor agrees (in addition to the representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute the Contract, that the Contractor shall be restricted to the rights and remedies set forth in Article 15 of these General Conditions as between the Contractor and the Owner. This Paragraph 3.20 shall survive the expiration or sooner termination of the Contract.

...
~~The Owner and Contractor shall include the Architect~~

...
~~in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect and Project Representative about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with Separate Contractors separate contractors shall be through the Owner. The Contract Documents may specify other communication protocols.~~

...
§ 4.2.5 Based on the Architect's and Project Representative's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

...
§ 4.2.6 The Architect ~~has and~~ Project Representative ~~have~~ authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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~~§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives. The Project Representative will assist the Architect in carrying out the Architect's responsibilities at the site.~~

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§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required. No increase to the Contract Sum shall be permitted for any such substitution.

...

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

...

§ 5.5 PAYMENTS TO SUBCONTRACTORS OR MATERIAL SUPPLIER BY THE CONTRACTOR

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§ 5.5.1 The Contractor shall pay each Subcontractor, upon receipt of payment from the Owner, an amount equal to the percentage of completion allowed to the Contractor, on account of such Subcontractor's work, less the percentage retained from payments to the Contractor. The Contractor shall also require each Subcontractor to make similar payments to Sub-Subcontractors. All such payments shall be paid within twenty (20) days. In the event a Subcontractor or material supplier alleges that the Contractor has failed to pay it in full, the Owner may, in addition to its other rights, set off said amounts from any amount due and owing to the Contractor.

...

§ 5.6 PAYMENTS TO SUBCONTRACTORS BY THE OWNER.

...

If the Owner assigns the subcontract to a successor contractor § 5.6.1 If the Owner fails to approve an Application for Payment for a cause which the Owner and Architect determine is the fault of the Contractor, and not the fault of the particular Subcontractor, or if the Contractor fails to make payment which is properly due to a particular Subcontractor, the Owner may pay such Subcontractor directly, less the amount to be retained under its Subcontract.

...

or other entity, the Owner § 5.6.2 The Owner shall have no obligation to pay, or to see to the payment of, any monies to any Subcontractor or material supplier. Nothing contained in Paragraph 5.6.1 shall be deemed to create any contractual duty of the Owner to any Subcontractor or to create any rights in any Subcontractor against the Owner.

...

shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract. § 5.6.3 The Contractor shall promptly advise the Owner and the Architect of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor claiming any default by the Contractor in any of its obligations to such Subcontractor.

...

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each ~~Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors~~ separate contractor with the Work of the Contractor through the Project Representative. The Contractor shall participate with other separate contractors, Project Representative, and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to ~~its~~ the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, ~~Separate Contractors, separate contractors~~ and the Owner until subsequently revised.

...

Notwithstanding, it shall be the Contractor's sole responsibility to ensure its Work is properly coordinated and sequenced with Owner's own forces and each separate contractor to ensure the orderly completion of the Contractor's Work in accordance with the Contract Time without interfering or delaying the performance of the Owner's own forces or separate contractors

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§ 6.2.3 The Contractor shall ~~reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.~~ promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5. The Contractor agrees to defend, indemnify and hold harmless the Owner from and against any claims or damages brought by a separate Contractor arising out of actions or omissions of the Contractor, its Subcontractors, Sub-Subcontractors or suppliers in performing the Work

...

under the Contract Documents.

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§ 7.3.11 As referred to in sub-paragraph 7.3.8, the reasonable amount for overhead and profit shall be calculated as follows:

...

	<u>Overhead</u>	<u>Profit</u>
<u>For cost of work performance by the Contractor's or Subcontractor's own forces</u>	<u>5%</u>	<u>5%</u>
<u>For cost of work performed by subcontract or sub-contract to the Contractor or Subcontractor</u>	<u>5%</u>	<u>5%</u>

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Overhead shall be calculated against the cost of the work. Profit shall be calculated against the sum of the cost of the work and overhead.

...

§ 8.2.4 It is mutually agreed by and between the parties hereto that time shall be an essential part of the Contract and that in case of the failure on the part of the Contractor to complete the Project within the time specified and agreed upon, the Owner will be damaged thereby. Further, it is mutually agreed that the amount of said damages,

including, but not limited to, loss of use, expenses for inspection, superintendence and necessary traveling expenses, being difficult, if not impossible, of definite ascertainment and proof, it is hereby agreed that the reasonable amount of liquidated damages shall be in accordance with Paragraph 9.11.

...

§ 8.2.5 COMPLETION OF PROJECT: The Project shall be completed within the dates specified.

...

§ 8.2.5.3 EXTRAORDINARY MEASURES. In the event the Owner, after consultation with the Architect, determines that the performance of the Work has not progressed or reached the level of completion required by the Contract Documents, and the Project construction schedule, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, but not limited to, working additional shifts or overtime; supplying additional manpower, equipment, and facilities; and other similar measures (referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the Project construction schedule and failure to comply shall be considered as breach of the Contract Documents. The Contractor shall not, under any circumstances, be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by Owner under or pursuant to this Paragraph 8.2.5.3.

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§ 8.2.5.4 The Owner may exercise its rights pursuant to Paragraph 8.2.5.3 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any completion dates set forth in the Contract Documents.

...

§ 8.2.6 DELIVERY: Delivery of equipment shall be completed in a manner to comply with construction schedule requirements. Project scheduling may require quick-ship and/or express courier at premium rates that the contractor will be responsible for under contract. Any charges incurred by the Owner as a result of failure to complete installation by the date specified, such as temporary rentals, custodial overtime, etc. will be deducted from the vendor's invoice.

...

§ 8.3 Delays and Extensions of Time

...

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by ~~(1) an act or neglect of the Owner or Architect, or of an employee of either, or of a Separate Contractor;~~ ~~(2) separate contractor employed by the Owner;~~ or by changes ordered in the Work; ~~(3) or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, casualties or other causes beyond the Contractor's control;~~ ~~(4) reasonable control;~~ or by delay authorized by the Owner pending mediation and binding dispute resolution; or ~~(5) by other causes that the Contractor asserts, and the Architect determines, litigation; or by other causes that the Architect determines may justify delay,~~ then the Contract Time shall be extended by Change Order to the extent such delay shall prevent the Contractor from achieving Substantial Completion within the Contract Time and if the performance of the Work is not, was not, or would not have been delayed by any other cause for such reasonable time which the Contractor is not entitled to an extension in the

Contract Time under the Contract Document. The Contractor further acknowledges and agrees that adjustments in the Contract Time for delay will only be allowed to the extent such delay is not caused by the Contractor, could not have been anticipated by the Contractor, could not be limited or avoided by the Contractor's timely notice to the Owner of the delay, and is of a duration not less than one (1) day.

...

§ 8.3.1.1 No extension of Contract Time will be considered or approved if the act or occurrence constituting the basis of the request or claim is for non-delivery of materials due to any act or neglect of the Contractor, or the failure of the Contractor to employ, furnish or obtain, as the Architect may determine necessary for the timely prosecution of the Work, shop drawings, sufficient labor, materials or equipment, or other matters which are within the control of the Contractor. Any delay which results due to any of the foregoing causes shall be the sole responsibility of the Contractor.

...

§ 8.3.3 This Section 8.3 does not preclude recovery. No payment or compensation will be made to the Contractor as compensation for damages for any delays or hindrances from any cause whatsoever in the progress of the Work, notwithstanding whether such delays be avoidable or unavoidable. The Contractor's sole remedy for delays shall be an extension of Contract Time, pursuant to and only in accordance with this Paragraph 8.3. Such extension shall be a period equivalent to the time lost, day for day, by reason of any and all of the aforesaid causes. Nor will the Contractor be permitted to make any claim for acceleration or for costs or expenses associated with acceleration nor will the Contractor be permitted to make a claim for out-of-sequence work (e.g., winter protection costs) or expenses, damages, loss of profits (anticipated or otherwise) or charges of any nature whatsoever (including, but not limited to, legal fees and professional fees). In the event that the Contractor chooses to assert such a claim for delay, acceleration or out-of-sequence work, or litigate this provision, and the Contractor fails to prevail as to its entire claim in its litigation, the Contractor shall be liable to the Owner and shall reimburse the Owner for any legal fees, professional fees, costs or expenses associated with analyzing, defending or otherwise opposing any such claim or litigation.

...

of damages for delay § 8.3.4 The Contractor shall recognize and reasonably anticipate that as the job progresses the Owner's representative may be making changes in and updating the construction schedules. Therefore, no claim for an increase in the Contract Sum for either acceleration, delay or out-of-sequence work will be allowed for decisions as to extensions of time pursuant to Paragraph 8.3 or for other changes in the construction schedules which may be experienced.

...

§ 8.3.5 No extension of Contract Time granted by the Owner shall be or shall be deemed to be a waiver by the Owner of any rights accruing to it under the Contract, and no extension of Contract Time granted by the Owner shall relieve or shall be deemed to relieve the Contractor from full responsibility for performance of the Work of the Contract.

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either party under other provisions of the Contract Documents. § 8.3.6 Should the Owner be prevented or enjoined from proceeding with the Project either before or after the start of construction by reason of any litigation or any other reason beyond the control of the Owner, the Contractor shall not be entitled to make or assert claims for damage by reason of said delay or for acceleration or out-of-sequence work; but time for completion of the Work will be extended to such reasonable time as the Owner and Architect may determine will compensate for time lost for such delay with such determination to be set forth in writing.

...

~~§ 9.3.1 At least ten days before the date established for each progress payment, By the 20th day of each month, the Contractor shall submit to the Architect ~~an and~~ Project Representative a draft itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The values and covering all Work completed as of the 15th day of the month, including Saturdays if applicable. Such application shall be notarized, if required, and supported by all such data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and as the Owner, Project Representative, or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet. Weekly Payroll Certification forms must accompany each Application for Payment.~~

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~~.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or~~

...

~~.7 repeated failure to carry out the Work in accordance with the Contract Documents. Documents; or~~

...

~~.8 failure to submit Wage Certifications required by the Department of Labor and Industry to demonstrate payment of Prevailing Wages to the employees of Contractor and each Subcontractor.~~

...

~~§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15. If the Contractor disputes any determination by the Architect with regard to any Certificate of Payment, the Contractor shall nevertheless expeditiously continue to prosecute Work.~~

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~~§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect. Such payment by the Owner shall not constitute approval or acceptance of any item of cost in the Application for Payment. No partial payment made hereunder shall be or be construed to be acceptance or approval of that portion of the Work to which such partial payment relates or relieve the Contractor of any of its obligations hereunder with respect thereto.~~

...

~~If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.~~

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~~§ 9.10.4 The making of final payment shall not constitute a waiver of Claims by the Owner except those arising from~~

...

~~.1—liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;~~

...

~~.2—failure of the Work to comply with the requirements of the Contract Documents;~~

...

~~.3—terms of special warranties required by the Contract Documents; or~~

...

~~.4—audits performed by the Owner, if permitted by the Contract Documents, after final payment.~~

...

§ 9.11.1 The Contractor and Contractor's Surety shall be liable for and shall pay the Owner the cost of expenses incurred by the Owner resulting from the Contractor's delay in completing the Work of the contract within the Contract Time or failing to submit information required by the Contract Documents and Specifications, as liquidated damages, and not as a penalty, in the amount of Five Hundred Dollars (\$500.00) per calendar day of delay, for each calendar day of delay until the work is substantially complete at each phase of construction, subject to adjustments of the Contract Time as provided in the Contract Documents. In the event the Contractor or Surety litigates the validity of this provision, and does not completely prevail on their challenge, the Contractor and Surety, jointly and severally, shall be liable for legal fees, professional fees, costs or other expenses and damages incurred by the Owner in defending the challenge.

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~~§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel. The Contractor shall not use or store hazardous materials or equipment, or consider unusual methods the Contractor may believe are necessary, without first obtaining written consent from the Owner for each individual consideration. Use of explosives is not permitted under any circumstances.~~

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§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of the types or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

...

and limits. 1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

...

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the

Contractor's employees;

...

~~of liability, containing~~ .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

...

.4 Claims for damages insured by usual personal injury liability coverage;

...

~~the endorsements,~~ .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

...

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

...

~~and subject~~ .7 Claims for bodily injury or property damage arising out of completed operations; and .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

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~~to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance. Prior to the commencement of any Work and until completion and final payment is made for the Work, the Contractor shall, at its sole expense, maintain the following insurance on its own behalf, with an insurance company or companies having an A.M. Best Rating of "A-Class VII" or better, and furnish to the Owner Certificates of Insurance evidencing same.~~

...

The term "Contractor" as used in these Insurance Requirements shall mean and include Subcontractors and Sub-Subcontractors of every tier..

...

~~in the jurisdiction~~ § 11.1.1.1 Workers' Compensation and Employer's Liability: in the Commonwealth of Pennsylvania and shall

...

include, where applicable, U.S. Longshoremen's and Harbor Workers' Coverage.

...

Workers' Compensation Coverage: Statutory Requirements

...

Employers Liability Limits not less than:

...

Bodily Injury by Accident: \$100,000

...

Each Accident Bodily Injury by Disease: \$100,000

...

Each Employee Bodily Injury by Disease: \$500,000 Policy Limit

...

§ 11.1.1.2 Commercial General Liability: (including Premises - Operations, Independent Contractors, Products/Completed Operations, Broad Form Property Damage, Contractual Liability (including Liability for Employee Injury assumed under a Contract), and Explosion, Collapse and Underground Coverages).

...

Occurrence Form with the following limits:

...

General Aggregate: \$3,000,000

...

Products/Completed Operations Aggregate: \$2,000,000

...

Each Occurrence: \$1,000,000

...

Personal and Advertising Injury: \$1,000,000

...

Fire Damage (any one fire): \$50,000

...

Medical Expense (any one person): \$5,000

...

Products/Completed Operations Coverage must be maintained for a period of at least two (2) years after final payment. The General Aggregate Limit must apply on a Per Project basis.

...

§ 11.1.1.3 Automobile Liability:

...

Coverage to include: All Owned, Hired and Non-Owned Vehicles; Contractual Liability Coverage (including Liability for Employee Injury assumed under a

...

Contract)

...

Per Accident Combined Single Limit \$1,000,000

...

§ 11.1.1.4 Commercial Umbrella Liability:

...

Occurrence Limit: \$3,000,000

...

Aggregate Limit (where applicable): \$3,000,000

...

Policy to apply excess of the Commercial General Liability (following form Per Project Limit), Commercial Automobile Liability and Employers Liability Coverages.

...

is located. The Owner, Architect, It is recommended that all Subcontractors and Sub-subcontractors maintain Commercial Umbrella Liability Coverage with Limits of \$2,000,000 Each Occurrence/Aggregate.

...

§ 11.1.1.5 Deductibles of Self Insured Retentions:

...

None of the policies of insurance required of the Contractor by this agreement shall contain deductibles or self insured retentions in excess of \$10,000.

...

and Architect's consultants shall be named as § 11.1.1.6 Reading School District and Consolidated Engineers shall be added as ADDITIONAL INSURED on all liability policies.

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additional insureds under § 11.1.1.7 Contractor's and Subcontractors' insurance is to be endorsed to reflect it is primary and non-contributory for the Owner, and any other additional insured named in these insurance requirements.

...

the Contractor's commercial general liability policy or as otherwise described in the Contract Documents. § 11.1.1.8 It is agreed the Contractors' and Subcontractor's insurance will not be canceled, materially changed or non-renewed without at least thirty (30) days advance written notice to the Owner.

...

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as 11.1.1.9 Waiver of Rights of Recovery and Waiver of Rights of Subrogation: The Contractors and Subcontractors waive all rights of recovery against the Owner, and any other additional insured for loss or damage covered by any of the insurance maintained by the Contractor and Subcontractor pursuant to this contract.

...

required by the Contract Documents. If any of the policies of insurance required under the Contract Documents require an endorsement to provide for the waiver of subrogation, then the named insureds of such policies will cause them to be so endorsed.

...

The Contractor shall purchase and maintain the required bonds from a company § 11.1.1.10 The amount of insurance provided in the aforementioned insurance coverages, shall not be construed to be a limitation of the liability on the part of the Contractors or any of their Subcontractors.

...

or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located. § 11.1.1.11 Any type of insurance or any increase in limits of liability not described above which the Contractors or Subcontractors require for their own protection or on account of statute shall be the responsibility of the Contractor or any Subcontractor at their sole expense.

...

§ 11.1.3 Upon the request of any person or entity appearing 11.1.1.12 The carrying of insurance described shall in no way be interpreted as relieving the Contractors or Subcontractors of any responsibility or liability under the contract.

...

to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished. § 11.1.1.13 Prior to the commencement of work and/or payment, the Contractors and Subcontractors shall file Certificates of Insurance with Owner, which shall be subject to the Owner's approval of adequacy of protection and the satisfactory character of the insurer. The Certificates of Insurance should be mailed within five days of receipt of these insurance requirements to the Owner regardless of when the work will start. Project description and Job Number must be shown on the Certificate of Insurance.

...

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration 11.1.1.14 In the event of a failure of Contractor to furnish and maintain said insurance and to furnish satisfactory evidence thereof, the Owner shall have the right (but not the obligation) to take out and maintain the same for all parties on behalf of the Contractor who agrees to furnish all necessary information thereof and to pay the cost thereof to the Owner immediately upon presentation of an invoice.

...

of any insurance required by the Contract Documents. § 11.1.1.15 In no event shall the Contractor begin work until a Certificate of Insurance showing coverage in the aforementioned amounts required for the job is received and approved by the Owner. Any work performed without having the Certificate of Insurance received and approved by the Owner is at Contractor's own risk.

...

the Contractor shall provide notice to the Owner of such impending § 11.1.1.16 The Contractor shall furnish one (1) copy each of Certificate of Insurance herein required for each copy of the Agreement which shall specifically set forth evidence of all coverage required. The form of the Certificate shall be ACORD, Certificate of Liability Insurance. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits.

...

or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission § 11.1.2 The insurance required by Article 11 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

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of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the § 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by Article 11 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until

at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

...

~~Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.~~ § 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

...

§ 11.2 Owner's-11.1.5 Property Insurance

...

~~§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required-~~ 11.1.5.1 The Contractor shall purchase and maintain property insurance on an "all risk" basis upon the entire Work at the site to the full insurable value thereof. Such insurance shall be in a company or companies against which the Owner has no reasonable objection. This insurance shall include the interests of Owner, Contractor, Subcontractors, and Sub-subcontractors in the Work and shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief. If not covered under "all risk" insurance or otherwise provided in the Contract Documents, Contractor shall effect and maintain similar property insurance on 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 Payments under Subparagraph 9.3.2.

...

~~insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.~~ § 11.1.5.2 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss. The form of policy of this coverage shall be Completed Value.

...

~~§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall~~ 11.1.5.3 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the

event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order, the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

...

~~§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days~~
11.1.5.4 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

...

~~of the date the Owner becomes aware of an impending~~ § 11.1.5.5 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

...

~~or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of~~ § 11.1.5.6 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

...

~~the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance~~ § 11.1.5.7 If mandatory deductibles are required, or if the Contractor should elect, with the concurrence of the Owner, to increase the mandatory deductible amounts of purchase this insurance with voluntary deductible amounts the Contractor shall be responsible for payment of the amount of all deductibles in the event of a paid claim. If separate Contractors are added as insured to be covered by this policy, the separate Contractors shall be responsible for payment of the appropriate part of any deductibles in the event claims are paid on their part of the Project.

...

§ 11.2 Owner's Insurance

...

~~shall be charged to the~~ The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

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§ 11.2.1 Boiler and Machinery Insurance

...

Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance. The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

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§ 11.6 PERFORMANCE BOND AND PAYMENT BOND

...

§ 11.6.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract. The Contractor shall provide a performance bond and a labor and material payment bond, each in the amount of 100% of the contract price, before the award of the contract.

...

§ 11.6.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

...

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within ~~one year~~ the applicable statute of limitations, including discovery rule, after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of ~~any~~ an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so, ~~so~~ unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the ~~one-year period~~ statute of limitations, including discovery rule, for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

...

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work. Any applicable statute of limitations, shall be extended by the amount of time required for correction of Work performed after Substantial Completion.

§ 12.2.6 Nothing contained in Paragraph 12.2 shall decrease the responsibilities set forth in the Performance Bond.

...

§ 13.1 Governing Law

...

§13.1 GOVERNING LAW

...

The Contract shall be governed by the law of the ~~place where~~ Commonwealth of Pennsylvania without regard to its principles of conflicts of law.

...

§13.1.2 STATUTORY REQUIREMENTS

...

The Contractor's attention is directed to the fact that all applicable Federal and State laws, local ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Agreement throughout, and shall govern the Work performed pursuant to the Contract Documents, and they are deemed to be included in the Agreement the same as though written therein in full. Owner assumes no liability for or Contactor's failure to adhere to and comply with any and all Federal and State laws, local laws and ordinances, and the rules and regulations of all authorities having jurisdiction over Construction of the Project, including, without limitation, those listed below.

...

§13.1.3 HUMAN RELATIONS ACT

...

is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.E. 744) (43 P.S. Section 951, et. seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, familial status, religious creed, ancestry, age, sex, national origin, handicap, disability, or use of guide or support animal, by employers, employment agencies, labor organizations, contractors and others. The Contractor shall agree to comply with the provisions to the Pennsylvania Human Relations Act, as amended from time to time, which is made part of the General Conditions as if included herein at length. The Contractor's attention is directed to the language of the Commonwealth's non-discrimination clause in 16 PA Code 49.101, et seq., as amended from time to time.

...

§13.1.4 STEEL PRODUCTS PROCUREMENT ACT:

...

In accordance with Act shall govern Section 15.4.3 of the 1978 General Assembly of the Commonwealth of Pennsylvania, if any steel or steel products are to be used or supplied in the performance of the Work, only that produced in the United States, as defined therein, shall be used and supplied in the performance of the Work. Contractor shall strictly comply with all requirements of the Pennsylvania Steel Products Procurement Act, 73 P.S. § 1881 et seq., with respect to the Work, which shall include, without limitation, using steel, steel products (including machinery and equipment) or cast iron produced in the United States unless otherwise exempted therefrom.

...

§ 13.2 Successors and AssignsIn accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States.

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§13.1.5 PREVAILING WAGE ACT

...

§ 13.2.4 The Owner, 1 Pennsylvania Prevailing Wage Act (Act No. 442 of 1961, P.L. 987, amended by Act 342 of 1963, P.L. 653), and as amended from time to time (43 P.S. Section 165-1, et seq.). The Pennsylvania Prevailing Wage Act, the regulations thereto, and the Prevailing Minimum Wage Determination Schedule, as determined by the Secretary of Labor and Industry, which shall be paid for each craft or classification of all workers needed to perform the Contract during the anticipated term therefore in the locality in which the Work is performed, are made part of these General Conditions.

...

.2 No person shall be employed to Work under this Contract except competent and first-class workers and mechanics. No workers shall be regarded as competent and first-class except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages and for such hours as established by the Secretary of the Department of Labor and Industry under the "Pennsylvania Prevailing Wage Act" (Act No. 442), effective February 1, 1962, amended by Act 342 of 1963, P.L. 653 and as amended from time to time.

...

§13.1.6 CRIMINAL HISTORY AND CHILD PROTECTIVE SERVICES INFORMATION

...

Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations containedPrior to commencing Work, the Contractor and each Subcontractor shall submit to the Owner on the prescribed form, for each employee or person performing work at the Project site on behalf of the Contractor and any Subcontractor prior to such person performing any work at the Project site, a complete:

...

.1 Original report of criminal history record information from the Pennsylvania State Police or a statement from the Pennsylvania State Police that the Pennsylvania State Police central repository contains no such information relating to any of Contractor's employees or its subcontractor's employees working on

the Project site prior to such persons performing work at the Project site. Such report of criminal history shall be dated no more than one (1) year prior to the date of execution of this Agreement. To obtain this document, contact the nearest Pennsylvania State Police barracks.

...

~~in the Contract Documents. Except~~ 2 Copy of the Federal Criminal History record from the Federal Bureau of Investigation in the manner prescribed by the Department of Education. To obtain such a report, contact the nearest FBI Field Office.

...

~~as provided in Section 13.2.2, neither party~~ 3 Original background check in accordance with Section 111 of the Public School Code of 1949, Act 34 of March 10, 1949, P.L. 30, No. 14, as amended by from time to time including, without limitation, by Act 114 of July 11, 2006, P.L. 1092, and Act 24 of 2011 (P.L. 112, No. 24) (24 P.S. Section 1-111, et seq.) on the form published by the Pennsylvania Department of Education.

...

.4 Official clearance statement obtained from the Pennsylvania Department of Public Welfare pursuant to the Contract Act 151 of December 16, 1994 (P.L. 1292), subchapter C.2 of the Child Protective Services Law, as amended from time to time.

...

~~shall assign~~ §13.1.6.1 The Contractor and its subcontractors shall refuse to employ any person as an independent contractor or employee whose Federal Criminal History record information indicates that such prospective employee has been convicted within five (5) years immediately preceding the date of the report of any of the following offenses:

...

~~the Contract~~ .1 An offense under one (1) or more of the following provisions of Title 18 of the Pennsylvania Consolidated Statutes:

...

- Chapter 25 (relating to criminal homicide).

...

- Section 2702 (relating to aggravated assault).

...

- Former section 2709(b) (relating to stalking).

...

- Section 2709.1 (relating to stalking).

...

- Section 2901 (relating to kidnapping).

...

- Section 2902 (relating to unlawful restraint).

...

- Section 3121 (relating to rape).

...

- Section 3122.1 (relating to statutory sexual assault).

...

- Section 3123 (relating to involuntary deviate sexual intercourse).

...

- Section 3124.1 (relating to sexual assault).

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- Section 3125 (relating to aggravated indecent assault).

...

- Section 3126 (relating to indecent assault).

...

- Section 3127 (relating to indecent exposure).

...

- Section 4302 (relating to incest).

...

- Section 4303 (relating to concealing death of child).

...

- Section 4304 (relating to endangering welfare of children).

...

- Section 4305 (relating to dealing in infant children).

...

- A felony offense under Section 5902(b) (relating to prostitution and related offenses).

...

- Section 5903(c) or (d) (relating to obscene and other sexual materials and performances).

...

- Section 6301 (relating to corruption of minors).

...

- Section 6312 (relating to sexual abuse of children).

...

~~as a whole without written consent.~~ 2 An offense designated as a felony under the act of April 14, 1972 (P.L. 233, No. 64), known as "The Controlled Substance, Drug, Device and Cosmetic Act."

...

.3 An out-of-State or Federal offense similar in nature to those crimes listed in Paragraphs 13.1.11.5.1 and 13.1.11.5.2.

...

§13.1.7. COMPETENT WORKMEN

...

~~of the other. If either party attempts to make an assignment without~~ §13.1.7.1 According to Section 752 of the Public School Code of 1949, no person shall be employed to do work under such contract except competent and first class workmen and mechanics.

...

~~such consent.~~ §13.1.7.2 No workmen shall be regarded as competent first class, within the meaning of this Act, except those who are duly skilled in their respective branches of labor, and who shall be paid not less than such rates of wages for such hours' work as shall be established and current rates of wages paid for such hours by employers of organized labor in doing similar work in the district where work is being done.

...

~~that party shall nevertheless remain legally responsible for all obligations under the Contract.~~ §13.1.8 ANTI-POLLUTION LEGISLATION 62 Pa. C.S.A. Section 3301 requires that Bidders on construction contracts, for the Commonwealth of Pennsylvania be advised that there are provisions of Federal and State statutes, rules and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources that affect the Project on which Bids are being received.

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~~§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.~~ §13.1.8.1 The Bidder shall become thoroughly acquainted with the terms of the listed statutes, rules and regulations, including, but not limited to, Flood Plain Management Act (32 P.S. Section 679.101, et seq.), Water Well Drillers License Act (32 P.S.

Section 645.1, et seq.), Pennsylvania Scenic Rivers Act (32 P.S. Section 820.21, et seq.), Dam Safety and Encroachment Act (32 P.S. Sec. 693.1, et seq.), Bluff Recession and Setback Act (32 P.S. Section 5201, et seq.), Storm Water Management Act (32 P.S. Section 680, et seq.), Pennsylvania Sewage Facilities Act (35 P.S. Section 750.1, et seq.), Pennsylvania Solid Waste Management Act (35 P.S. Section 6018.101, et seq.), Pennsylvania Safe Drinking Water Act (35 P.S. Section 721.1, et seq.), the Clean Streams Law (35 P.S. Section 691.901 et seq. and 35 P.S. Section 691.1 et seq.), Air Pollution Control Act (35 P.S. Section 4001, et seq.), Pennsylvania Historic Preservation Act (37 Pa. C.S.A. Section 501, et seq.), Pennsylvania Hazardous Sites Clean Up Act (35 P.S. Section 6020.101, et seq.), Pennsylvania Storage Tank and Spill Prevention Act (35 P.S. Sec. 6021.101, et seq.), Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. Sections 9601-9675) as amended, including, but not limited to, the Superfund Amendments and Reauthorization Act (P.L. 99-499), Federal Solid Waste Disposal Act (42 U.S.C. Sections 6901-6992), Federal Clean Air Act (Air Pollution Act) (42 U.S.C. Sections 7401-7642), Federal Safe Drinking Water Act (See Public Health Service Act Sections 1401-1451) (42 U.S.C. Sections 300f-300j-11), Wild and Scenic River Act (P.L. 90-542), Endangered Species Conservation Act of 1969 (P.L. 89-669), Endangered Species Conservation Act of 1973 (16 U.S.C. Sections 1531-1544), Federal Clean Water Act of 1977 (P.L. 95-217), Rivers and Harbor Act of 1970 (P.L. 91-611), Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Sections 136-136y), Toxic Substance Control Act (15 U.S.C. Sections 2601-2692), Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sections 6901-6991), Coastal Wetlands Planning, Protection and Restoration Act (16. U.S.C. Sections 3951-3956), Coastal Zone Management Act of 1972 (16 U.S.C. Sections 1451-1464), Community Environmental Response Facilitation Act (42 U.S.C. Section 9620), Emergency Planning and Right-to-Know Act of 1986 (42 U.S.C. Sections 11001-11050), Energy Supply and Environmental Coordination Act of 1974 (15 U.S.C. Sections 791-798), Environmental Quality Improvement Act of 1970 (42 U.S.C. Sections 4371-4375), Federal Facility Compliance Act of 1992 (42 U.S.C. Section 6901), Federal Land Policy and Management Act of 1976 (43 U.S.C. Sections 1701-1784), Federal Water Pollution Control Act (33 U.S.C. Sections 1251-1387), Geothermal Energy Research, Development, and Demonstration Act of 1974 (30 U.S.C. Sections 1101-1164), Global Climate Protection Act of 1987 (15 U.S.C. Section 2901 note), Hazardous Substance Response Revenue Act of 1980 (see 26 U.S.C. Sections 4611, 4612, 4661, 4662), Lead-Based Paint Exposure Reduction Act (15 U.S.C. Sections 2681-2692), Lead Contamination Control Act of 1988 (42 U.S.C. Sections 300j-21 to 300j-25), Low-Level Radioactive Waste Policy Act (42 U.S.C. Sections 2021b-2021d), National Climate Program Act (15 U.S.C. Sections 2901-2908), National Contaminated Sediment Assessment and Management Act (33 U.S.C. Section 1271 note), National Environmental Policy Act of 1969 (42 U.S.C. Sections 4321-4370b), National Ocean Pollution Planning Act of 1978 (33 U.S.C. Sections 1701-1709), Noise Control Act of 1972 (42 U.S.C. Sections 4901-4918), Oil Pollution Act of 1990 (33 U.S.C. Sections 2701-2761), Pollution Prevention Act of 1990 (42 U.S.C. Sections 13101-13109), Public Health Service Act (42 U.S.C. Sections 300f-300j-11), Renewable Resources Extension Act of 1978 (16 U.S.C. Sections 1671-1676), Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sections 6901-6991), Soil and Water Resources Conservation Act of 1977 (16 U.S.C. Sections 2001-2009), Water Resources Research Act of 1984 (42 U.S.C. Sections 10301-10309), Wood Residue Utilization Act of 1980 (16 U.S.C. Sections 1681-1687), Pennsylvania Worker and Community Right-to-Know Act (35 P.S. Section 7301, et seq.), Asbestos Hazard Emergency Response Act of 1986 (see Toxic Substances Control Act Sections 201-214) (15 U.S.C. Sections 2651-2654), Delaware River Basin Compact (32 P.S. Section 815.101, et seq.), Brandywine River Valley Compact (32 P.S. Section 818, et seq.), Wheeling Creek Watershed Protection and Flood Prevention District Compact (32 P.S. Section 819, et seq.), Susquehanna River Basin Compact (32 P.S. Section 820.1, et seq.), Chesapeake Bay Commission Agreement (32 P.S. Section 820.11, et seq.), Land and Water Conservation and Reclamation Act (32 P.S. Section 5101, et seq.), Wild Resource Conservation Act (32 P.S. Section 5301, et seq.), Cave Protection Act (32 P.S. Section 5601, et seq.), Rails to Trails Act (32 P.S. Section 5611, et seq.), Phosphate Detergent Act (35 P.S. Section 722.1, et seq.), Plumbing System Lead Ban and Notification Act (35 P.S. Section 723.1, et seq.), Publicly Owned Treatment Works Penalty Law (35 P.S. Section 752.1, et seq.), Pennsylvania Solid Waste-Resources Recovery Act (35 P.S. Section 755.1, et seq.), Sewage System Cleaner Control Act (35 P.S. Section 770.01, et seq.), Hazardous Material Emergency Planning and Response Act (35 P.S. Section 6022.101, et seq.), Oil Spill Responder Liability Act (35 P.S. Section 6023.1, et seq.), Land Recycling and Environmental Remediation Standards Act (35 P.S. Section 6026.101, et seq.), Radiation Protection Act (35 P.S. Section 7110.101, et seq.), Low-Level Radioactive Waste Disposal Act (35 P.S. Section 7130.101, et seq.), Pennsylvania Municipalities Planning Code (53 P.S. Section 10101, et seq.), regulations, ordinances, and other actions pursuant to the foregoing, regulations pertaining to Pennsylvania Erosion and Sediment Control, and so on. No separate or additional payment will be made for such compliance. In the event that the listed statutes, rules and regulations are amended, or if new statutes, rules or regulations become effective, after date of receipt of Bids, upon receipt of documentation which causes the Contractor to perform additional Work, the Owner may issue a Change Order setting forth the additional Work that must be undertaken and such additional Work shall be undertaken at no

additional cost to the Owner. It is also the responsibility of the Contractor to determine what local ordinances, if any, will affect their portion of the Work. The Contractor shall check for any County, City, Borough or Township rules or regulations applicable to the area in which the Project is being constructed and, in addition, for any rules or regulations of other organizations having jurisdiction, including, without limitation, chambers of commerce, planning commissions, industries or utility companies who have jurisdiction over lands which the Contractor occupies. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

...

~~§ 13.3 Rights and Remedies~~§13.1.9 EROSION CONTROL Contractors performing excavation work shall comply with all rules and

...

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder regulations of Chapter 102, Title 25 of Pennsylvania Soils Erosion and Sedimentation Control (25 Pa. Code Section 102.1, et seq.). Prior to any grading, the Contractor shall be responsible to obtain approval from the Department of Environmental Protection for an approved sedimentation and erosion control site plan and shall perform all necessary site work in accordance with said plan. The plan shall be available at the site at all times. Contractors performing excavation work shall maintain all devices as required to control erosion caused by storing water and preventing dust and particles from being distributed off site.

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~~shall be in addition to and not a limitation~~§13.1.9.1 ACT NO. 247 provides that if the successful Bidder must undertake additional work due to enactment of new, or the amendment of existing, statutes, rules or regulations occurring after the submission of the successful Bid, the Owner shall issue a Change Order setting forth the additional work that must be undertaken, which shall not invalidate the Contract. The cost of such a Change Order to the Owner shall be determined in accordance with the provisions of the Contract for change orders or force accounts or, if no such provision is set for the in the Contract, then the cost to the Owner shall be the Contractor's cost for wages, labor costs other than wages, wage taxes, materials, equipment rentals, insurance and subcontracts attributable to the additional activity plus a reasonable sum for overhead and profit; provided, however, that such additional costs to undertake the work not specified in the Invitation for Bids shall not be approved unless written authorization is given to the successful Bidder prior to his undertaking such additional activity. In the event of a dispute between the Owner and the successful Bidder, arbitration procedures may be commenced under Article 7 of the General Conditions.

...

~~of duties, obligations, rights, and remedies otherwise imposed~~§13.1.10 DEMOLITION All demolition work shall be performed in accordance with the regulations of the Pennsylvania Code, Chapter 5 and Subchapter B – Demolition Work.

...

~~or available by law~~§13.1.11 DISCRIMINATION Each Contract entered into by a governmental agency for the construction, alteration or repair of any public building or public work shall contain the following provisions by which the Contractor agrees:

...

~~§ 13.3.2 No action or failure to act by~~1 In the hiring of any employees for the manufacturer of supplies, performance of the Work, or any other activity required under the Contract or any subcontract, the Contractor,

Subcontractor, or any person acting on behalf of the Contractor or Subcontractor shall not, by reason of gender, race, creed, or color, discriminate against any citizen of the Commonwealth of Pennsylvania who is qualified and available to perform the Work to which the employment relates. (62 Pa. C.S.A. Section 3701).

...

~~the Owner, Architect, or Contractor.~~ 2 Neither the Contractor nor any Subcontractor nor any person on their behalf shall in any manner discriminate against or intimidate any employee involved in the manufacturer of supplies, the performance of Work, or any other activity required under the Contract on account of gender, race, creed, or color. (62 Pa. C.S.A. Section 3701).

...

~~shall constitute a waiver of a right.~~ 3 Contractors and Subcontractors shall establish and maintain a written sexual harassment policy and shall inform their employees of the policy. The policy must contain a notice that sexual harassment will not be tolerated and employees who practice it will be disciplined.

...

4 Contractors shall not discriminate by reason of gender, race, creed, or color against any Subcontractor or supplier who is qualified to perform the Work to which the Contracts relates.

...

~~or duty afforded them under the Contract, nor.~~ 5 Contractors and each Subcontractor shall furnish necessary employment documents and records to and permit access to their books, records, and accounts by the contracting agency and the Bureau of Contract Administration and Business Development, for purposes of investigation, to ascertain compliance with provisions of this Paragraph. If the Contractor or any Subcontractor does not possess documents or records reflecting the necessary information requested, the Contractor or Subcontractor shall furnish such information on reporting forms supplied by the contracting agency or the Bureau of Contract Administration and Business Development.

...

6 The Contractor shall ~~such action~~ include, without limitation, the provisions of this Paragraph in every subcontract so that such provisions will be binding, upon each Subcontractor.

...

~~or failure to act constitute approval of or acquiescence.~~ 7 The Commonwealth of Pennsylvania may cancel or terminate the Contract and all money due or to become due under the Contract may be forfeited for a violation of the terms and conditions of this Paragraph. In addition, the agency may proceed with debarment or suspension and may place the Contractor in the contractor responsibility file.

...

§13.1.12 TAX EXEMPTION Bid price shall not include taxes for which the Owner is exempt.

...

§13.2 PROHIBITION ON CASH ALLOWANCES Any reference that implies the presence of cash allowances must be deleted. Cash Allowances are prohibited.

...

~~in a breach thereunder, except as may be specifically agreed upon in writing.~~ **§13.3 STANDARD OF QUALITY** The various materials and products specified in the specifications by name or description are given to establish a standard of quality and of cost for bid purposes. It is not the intent to limit the bidder, the bid or the evaluation of the bid to any one material or product specified but rather to describe the minimum standard. When proprietary names are used, they shall be followed by the words "or alternatives of the quality necessary to meet the specifications". A bid containing an alternative which does not meet the specifications may be declared non-responsive. A bid containing an alternative may be accepted but, if an award is made to that bidder, the bidder will be required to replace any alternatives which do not meet the specifications.

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ARTICLE 14 – TERMINATION OR SUSPENSION OF THE CONTRACT

...

§ 44.1 Termination by the Contractor **13.6 SUCCESSORS AND ASSIGNS**

...

§ 44.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons: **13.6.1** The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

...

~~1~~ Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

...

~~2~~ An act of government, such as a declaration of national emergency, that requires all Work to be stopped; **§ 13.6.2** The Owner may, without consent of the Contractor, assign the Contract to

...

~~3~~ Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract

...

~~4~~ The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2- Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

...

~~§ 14.1.2 The Contractor may terminate~~ 13.7 WRITTEN NOTICE

...

~~the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less. Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.~~

...

~~§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner~~ 13.8 RIGHTS AND REMEDIES

...

~~and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred.~~ § 13.8.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

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~~by reason of such termination.~~ § 13.8.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

...

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

...

~~§ 14.1.4~~ 14.1 Termination by the Contractor

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~~§ 14.1.1 If the Work is stopped for a period of 60 consecutive days under any final, non-appealable order of any court or other public authority having jurisdiction, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, Contractor or a Subcontractor or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days² under the Contract with the Contractor, then the Contractor may, upon fourteen (14) days written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.~~ payment for all Work properly executed in

...

accordance with the requirements of the Contract Documents. In such event, the Contractor shall be entitled to payment for Work performed at the Project site only. This is the Contractor's sole remedy. If the Contractor

challenges termination, the Contractor will forfeit its right to recover payment under this Paragraph 14.1.1 and will be responsible for all of the Owner's costs including, but not limited to, legal fees, professional fees and other expenses and costs.

...

.1 ~~repeatedly~~ refuses or fails to supply enough properly skilled workers or proper materials;

...

.3 ~~repeatedly~~ disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

...

.4 otherwise ~~is guilty of substantial breach of~~ materially breaches a provision of the Contract Documents.

...

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment ~~until the Work is finished.~~

...

§ 14.2.4 If the ~~unpaid balance of the Contract Sum exceeds~~ costs of finishing the Work, including compensation for the Architect's services and expenses made necessary ~~thereby, by the termination,~~ and other damages incurred by the Owner ~~and not expressly waived, such excess shall be paid to the Contractor.~~ If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner immediately upon demand by the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

...

The costs of finishing the Work shall include, but not be limited to, all reasonable legal fees, professional fees, additional title costs, insurance, additional interest because of any delay in completing the Work, and all other direct and indirect consequential and/or incidental costs incurred by the Owner by reason of the termination of the Contractor as stated herein.

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§ 14.2.5 In the event the Owner elects to terminate the Contractor for cause, the Owner may recover against the Contractor and Surety as part of its damages any and all legal fees, professional fees, jointly and severally, including, but not limited to, architectural fees, construction management fees, legal fees, and all other costs and expenses related thereto. The Owner shall have the right to set off said amounts against any amount alleged to be due and owing to the Contractor on the base amount of the Contract. Further, should the Contractor fail to achieve Final Completion promptly, upon written recommendation by the Architect and upon notice to the Contractor and after reasonable opportunity to cure, the Owner may, for cause, terminate the Contractor, complete the Work, and recover against the Contractor or Surety, any and all amounts that the Owner incurs, including, but not limited to, any and all legal fees, professional fees and all other costs and expenses related thereto.

...

§ 14.2.6 In the event that the Owner declares the Contractor in default and the Contractor's Surety fails to adhere to its obligations under the Performance Bond and Payment Bond, the Surety shall be liable to the Owner for any and all damages that the Owner incurs including, but not limited to, any legal fees, professional fees, or other costs or expenses incurred by the Owner in connection with the Owner's pursuit of its rights under the Performance Bond.

Payment Bond and/or applicable law, including, but not limited to, the cost of all litigation, legal fees, professional fees, and all other costs and expenses.

...

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine. In such event, if applicable, the Contractor shall be entitled to an extension of the Contract Time pursuant to Paragraph 8.3.1; provided, however, the Contractor shall not be entitled to any adjustment of the Contract Sum.

...

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement. Contractor shall be entitled to receive payment from the Owner for Work performed by the Contractor in accordance with the Contract Documents (including reasonable overhead and profit on such Work performed). The Contractor shall not be entitled to receive any other compensation, including, without limitation, for field and office overhead or profit (e.g. expected or actual profit), termination expenses or damages.

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§ 15.1.3.1 ~~Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall the Contractor must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant Contractor first recognizes the condition giving rise to the Claim, whichever is later.~~

...

§ 15.1.3.2 ~~Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.~~

...

§ 15.1.4.2 ~~The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.~~

...

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 written notice as provided herein shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

...

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have

been reasonably anticipated, and had an adverse effect on the scheduled construction, during such abnormal period of time, and will have an unavoidable and material effect on the overall construction.

...

§ 15.1.6.3 Construction Acceleration Claims

...

No claim for an increase in the Contract Sum or change in the Contract Time shall be based on construction acceleration. Accordingly, no course of conduct or dealings between the parties, or any express or implied statements made by the parties, nor any express or implied acceptance of alterations to the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work, whether or not there is in fact any such unjust enrichment, shall be the basis for any claim to an increase in the Contract Sum or change in the Contract Time.

...

The Contractor and Owner waive Claims against each other for consequential-waives claims against the Owner for consequential and/or incidental damages arising out of or relating to this Contract. This mutual-waiver includes waiver includes, but is not limited to:

...

- 1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, Consequential damages incurred by the Contractor for principal office expenses including, but not limited to, the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and actual and expected profits.

...

- 2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work. Incidental damages incurred by the Contractor including, but not limited to, costs resulting from stopping the Work, removing and transporting the Contractor's property (e.g., the Contractor's equipment, supplies and materials), and storing the Contractor's property (e.g., the Contractor's equipment, supplies and materials) at an alternate location.

...

This mutual-waiver is applicable, without limitation, to all consequential damages due to either party's and/or incidental damages, due to either the Contractor and/or the Owner's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment. Notwithstanding anything else to the contrary in the Contract Documents, the Owner shall have the right to recover consequential damages and/or incidental damages from the Contractor to the extent permitted by law.

...

§ 15.1.8 Claims for Economic Loss

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of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents. The Contractor shall have no claim or right of recovery of damages against the Owner and/or the Architect for economic loss sustained, in whole or in part, by any act or omission of the Owner and/or the Architect to the extent that such act or omission constitutes a breach of contract. Specifically, and without limiting the generality of the foregoing, the Contractor shall have no claim against the Owner or the Architect for economic loss based upon any tort, including, without limitation, negligence, negligent misrepresentation or any other tort-based theory of liability.

...

~~§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.~~

...

~~§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1. When a written decision of the Architect states that (1) the decision is final but subject to mediation and/or litigation and (2) filing of mediation and/or a lawsuit covered by such decision must be made by the~~

...

~~§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision. Contractor within thirty (30) days after the date on which the Contractor receives the final written initial decision, then the Contractor's failure to file mediation and/or a lawsuit within said thirty (30) days' period shall result in the Architect's decision becoming final and binding upon the Contractor and the Contractor shall have waived its right to mediate and/or litigate any subject matter addressed in such initial decision. In the event the Contractor attempts to pursue mediation or litigation of such subject matter, the Contractor shall reimburse the Owner, within thirty days of demand, all fees and costs incurred by the Owner, including, without limitation, attorneys' fees, in connection therewith.~~

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~~§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, Contract shall be subject to mediation as a condition precedent to binding dispute resolution.~~

...

~~§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Berks County Bar Association in accordance with its Construction Industry Mediation Procedures rules in effect on the date of the Agreement. filing of mediation. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

...

~~§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.~~

...

~~§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.~~

...

~~§ 15.4 Arbitration~~

...

~~§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. §15.3.4 To the extent either the Owner or the Contractor pursues a Claim or otherwise commences litigation in connection with this Contract and the Owner prevails, partially or completely, on any or all of its own Claims or leaves the Contractor with less than one hundred percent (100%) recovery of the maximum amount claimed due to the Contractor during the resolution process of such Claim or litigation, the~~

...

~~§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim. Contractor shall be liable for any and all legal fees, professional fees, costs or expenses of the Owner, as well as the true cost of any of the Owner's employees' time, associated with analyzing any Claim, pursuing litigation or defending the Claim or~~

...

~~§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof. litigation. The Owner may (a) deduct such legal fees, professional fees, costs and expenses from any~~

...

~~§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.~~ amounts otherwise due to the Contractor under

...

~~§ 15.4.4 Consolidation or Joinder~~

...

~~§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).~~ the Contract, to the extent available or (b) submit an invoice to the Contractor identifying such amounts due and the Contractor shall immediately reimburse the Owner for

...

~~§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.~~ such amount upon receipt of the invoice.

PAGE Error! Bookmark not defined.

~~§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.~~

Certification of Document's Authenticity

AIA® Document D401™ – 2003

I, Alicia S. Luke, Esquire, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 15:25:37 ET on 10/13/2021 under Order No. 2114247276 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ - 2017, General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

(Signed)

(Title)

(Dated)



AIA Document A305

Contractor's Qualification Statement

1986 EDITION

This form is approved and recommended by The American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by the AIA or AGC.

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO:

ADDRESS:

SUBMITTED BY:

NAME:

ADDRESS:

PRINCIPAL OFFICE:

- Corporation
- Partnership
- Individual
- Joint Venture
- Other

NAME OF PROJECT (if applicable):

TYPE OF WORK (file separate form for each Classification of Work):

_____ General Construction

_____ Plumbing

_____ Other _____

(please specify)

_____ HVAC

_____ Electrical

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- 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

2. LICENSING

- 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

- 2.2 List jurisdictions in which your organization's partnership or trade name is filed.

3. EXPERIENCE

- 3.1 List the categories of work that your organization normally performs with its own forces.

- 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)

3.2.1 Has your organization ever failed to complete any work awarded to it?

3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

- 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

3.4.1 State total worth of work in progress and under contract:

3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

3.5.1 State average annual amount of construction work performed during the past five years:

3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

4. REFERENCES

4.1 Trade References:

4.2 Bank References:

4.3 Surety:

4.3.1 Name of bonding company:

4.3.2 Name and address of agent:

5. FINANCING

5.1 Financial Statement.

5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

5.1.3 Is the attached financial statement for the identical organization named on page one?

5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

6. SIGNATURE

6.1 Dated at _____ this _____ day of _____ 20____

Name of Organization:

By:

Title:

6.2

M _____ being
duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be
misleading.

Subscribed and sworn before me this _____ day of _____ 20____

Notary Public:

My Commission Expires:



CAUTION: You should sign an original AIA document which has this caution printed in red. An original assures that changes will not be obscured as may occur when documents are reproduced.

PENNSYLVANIA CHILD ABUSE HISTORY CERTIFICATION

Type or print clearly in ink. If obtaining this certification for non-volunteer purposes or if, as a volunteer having direct volunteer contact with children, you have obtained a certification free of charge within the previous 57 months, enclose an \$13.00 money order or check payable to the PENNSYLVANIA DEPARTMENT OF HUMAN SERVICES or a payment authorization code provided by your organization. **DO NOT send cash.**

Certifications for the purpose of "volunteer having direct volunteer contact with children" may be obtained free of charge once every 57 months.

Send to CHILDLINE AND ABUSE REGISTRY, PA DEPARTMENT OF HUMAN SERVICES, P.O. BOX 8170 HARRISBURG, PA 17105-8170.

APPLICATIONS THAT ARE INCOMPLETE, ILLEGIBLE OR RECEIVED WITHOUT THE CORRECT FEE WILL BE RETURNED UNPROCESSED. IF YOU HAVE QUESTIONS CALL 717-783-6211, OR (TOLL FREE) 1-877-371-5422.

PURPOSE OF CERTIFICATION (Check one box only)

- | | |
|---|--|
| <input type="checkbox"/> Foster parent
<input type="checkbox"/> Prospective adoptive parent
<input type="checkbox"/> Employee of child care services
<input type="checkbox"/> School employee governed by the Public School Code
<input type="checkbox"/> School employee not governed by the Public School Code
<input type="checkbox"/> Self-employed provider of child-care services in a family child-care home
<input type="checkbox"/> An individual 14 years of age or older applying for or holding a paid position as an employee with a program, activity, or service
<input type="checkbox"/> An individual seeking to provide child-care services under contract with a child care facility or program
<input type="checkbox"/> An individual 18 years or older who resides in the home of a foster parent for children for at least 30 days in a calendar year
<input type="checkbox"/> An individual 18 years or older who resides in the home of a certified or licensed child-care provider for at least 30 days in a calendar year
<input type="checkbox"/> An individual 18 years or older, excluding individuals receiving services, who resides in a family living home, community home for individuals with an intellectual disability, or host home for children for at least 30 days in a calendar year
<input type="checkbox"/> An individual 18 years or older who resides in the home of a prospective adoptive parent for at least 30 days in a calendar year | <input type="checkbox"/> Volunteer having direct volunteer contact with children
<p>If purpose is volunteer having direct volunteer contact with children, choose SUB PURPOSE:</p> <input type="checkbox"/> Big Brother/Big Sister and/or affiliate
<input type="checkbox"/> Domestic violence shelter and/or affiliate
<input type="checkbox"/> Rape crisis center and/or affiliate
<input type="checkbox"/> Other: _____
<input type="checkbox"/> PA Department of Human Services Employment & Training Program participant (signature required below) |
|---|--|

SIGNATURE OF OIM/CAO REPRESENTATIVE

OIM/CAO PHONE NUMBER

AGENCY/ORGANIZATION NAME:

PAYMENT AUTHORIZATION CODE, IF APPLICABLE:

Consent/Release of Information Authorization form is attached. Applicant must fill in the "Other Address" sections. By completing the other address sections, you are agreeing that the organization will have access to the status and outcome of your certification application.

APPLICANT DEMOGRAPHIC INFORMATION (DO NOT USE INITIALS)

FIRST NAME	MIDDLE NAME	LAST NAME	SUFFIX
SOCIAL SECURITY NUMBER — — — — —	GENDER <input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not reported	DATE OF BIRTH (MM/DD/YYYY)	AGE

Disclosure of your Social Security number is voluntary. It is sought under 23 Pa.C.S. §§ 6336(a)(1) (relating to information in statewide database), 6344 (relating to employees having contact with children; adoptive and foster parents), 6344.1 (relating to information relating to certified or licensed child-care home residents), and 6344.2 (relating to volunteers having contact with children). The department will use your Social Security number to search the statewide database to determine whether you are listed as the perpetrator in an indicated or founded report of child abuse.

HOME ADDRESS	MAILING ADDRESS (if different from home address)	OTHER ADDRESS (if Consent/Release of Information Authorization form is attached)
ADDRESS LINE 1	ADDRESS LINE 1	ADDRESS LINE 1
ADDRESS LINE 2	ADDRESS LINE 2	ADDRESS LINE 2
CITY	CITY	CITY
COUNTY	COUNTY	COUNTY
STATE/REGION/PROVINCE	STATE/REGION/PROVINCE	STATE/REGION/PROVINCE
ZIP/POSTAL CODE	ZIP/POSTAL CODE	ZIP/POSTAL CODE
COUNTRY	COUNTRY	COUNTRY
<input type="checkbox"/> Different mailing address	ATTENTION	ATTENTION

CONTACT INFORMATION

HOME TELEPHONE NUMBER	WORK TELEPHONE NUMBER	MOBILE TELEPHONE NUMBER
EMAIL (By submitting an email contact, you are agreeing to ChildLine contacting you at this address.)		

PENNSYLVANIA CHILD ABUSE HISTORY CERTIFICATION

PREVIOUS NAMES USED SINCE 1975 (Include maiden name, nickname and aliases.)			
First	Middle	Last	Suffix
1.			
2.			
3.			
4.			
5.			

PREVIOUS ADDRESSES SINCE 1975 (Please list all addresses since 1975, partial address acceptable; attach additional pages if necessary.)
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

HOUSEHOLD MEMBERS (Please list everyone who lived with you at any time since 1975 to present. Please include parent, guardian or the person(s) who raised you; attach additional pages as necessary.)				
Name (First, Middle, Last)	Relationship	Present Age	Gender	
1.	<input type="checkbox"/> Parent <input type="checkbox"/> Guardian <input type="checkbox"/> person(s) who raised you			
2.	<input type="checkbox"/> Parent <input type="checkbox"/> Guardian <input type="checkbox"/> person(s) who raised you			
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

I affirm that the above information is accurate and complete to the best of my knowledge and belief and submitted as true and correct under penalty of law (Section 4904 of the Pennsylvania Crimes Code). If I selected volunteer, I understand that I can only use the certificate for volunteer purposes.

APPLICANT'S SIGNATURE
DATE

CHILDLINE USE ONLY		
DATE RECEIVED BY CHILDLINE	SUFFICIENT PAYMENT INFORMATION RECEIVED <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> VALID PAYMENT AUTHORIZATION CODE <input type="checkbox"/> WAIVED (supervisor initials) _____	CERTIFICATION ID #

INSTRUCTIONS TO COMPLETE THE PENNSYLVANIA CHILD ABUSE HISTORY CERTIFICATION APPLICATION:

General:

- Type or print clearly and neatly in ink only.
- If obtaining this certification for non-volunteer purposes or if, as a volunteer having direct volunteer contact with children, you have obtained a certification free of charge within the previous 57 months, enclose an \$13.00 money order or check for each application. No cash will be accepted. Personal, agency, or business checks are acceptable. Certifications for the purpose of “volunteer having direct volunteer contact with children” may be obtained free of charge once every 57 months. If no payment is enclosed for a non-volunteer purpose, you must provide a payment authorization code, otherwise your application will be rejected and returned to you.
- **DO NOT SEND POSTAGE PAID RETURN ENVELOPES** for us to return your results. Results are issued through an automated system generated mailing process.
- Certification results will be mailed to you within 14 days from the date the certification application is received at the ChildLine and Abuse Registry.
- Failure to comply with the instructions will cause considerable delay in processing the results of an applicant’s child abuse history certification application.

Purpose of Certification - Do not check more than one box:

- Check the **foster parent** box if applying for purposes of providing foster care.
- Check the **prospective adoptive parent** box if applying for the purpose of adoption.
- Check the **employee of child care services** box if applying for the purpose of child care services in the following:
 - Child day care centers; group day care homes; family day care homes; boarding homes for children; juvenile detention center services or programs for delinquent or dependent children; mental health services for children; services for children with intellectual disabilities; early intervention services for children; drug and alcohol services for children; and day care services or other programs that are offered by a school.
- Check the **school employee governed by the Public School Code** box if you are a school employee who is required to obtain background checks pursuant to Section 111 of the Public School Code and will continue to be required to obtain background checks prior to employment in accordance with that section and on the periodic basis required by Act 153.
- Check the **school employee not governed by the Public School Code** box if you are a school employee not governed by Section 111 of the Public School Code, but covered by Act 153 (pertaining to school employees in institutions of higher education).

Definition of school employee: A school employee is defined as an individual who is employed by a school or who provides a program, activity or service sponsored by a school. The term does not apply to administrative or other support personnel unless they have direct contact with children.

Definition of school: A facility providing elementary, secondary or postsecondary educational services. The term includes the following:

- (1) Any school of a school district.
 - (2) An area vocational-technical school.
 - (3) A joint school.
 - (4) An intermediate unit.
 - (5) A charter school or regional charter school.
 - (6) A cyber charter school.
 - (7) A private school licensed under the act of January 28, 1988 (P.L.24, No. 11), known as the Private Academic Schools Act.
 - (8) A private school accredited by an accrediting association approved by the state Board of Education.
 - (9) A non-public school.
 - (10) An institution of higher education.
 - (11) A private school licensed under the act of December 15, 1986 (P.L. 1585, No. 174), known as the Private Licensed Schools Act.
 - (12) The Hiram G. Andrews Center.
 - (13) A private residential rehabilitative institution as defined in section 914.1-A(c) of the Public School Code of 1949.
- Check the **self-employed provider of child-care services in a family child-care home** if providing child care services in one’s home (other than the child’s own home) at any one time to four, five, or six children who are not relatives of the caregiver.
 - Check the **individual 14 years of age or older who is applying for or holding a paid position as an employee** box if the employment is with a **program, activity, or service, as a person responsible for the child’s welfare or having direct contact with children:** Applying as an employee who is responsible for the child’s welfare or having direct contact (providing care, supervision, guidance, or control to children or having routine interaction with children) in any of the following in which children participate and which is sponsored by a school or public or private organization:
 - A youth camp or program;
 - A recreational camp or program;
 - A sports or athletic program;
 - A community or social outreach program;
 - An enrichment or educational program; and
 - A troop, club, or similar organization
 - Check the **individual seeking to provide child care services under contract with a child care facility or program** box if you are providing child care services as part of a contract or grant funded program.
 - Check the box for **individual 18 years or older who resides in the home of a foster parent for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.
 - Check the box for **individual 18 years or older who resides in the home of a certified or licensed child-care provider for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.

- Check the box for **individual 18 years or older, excluding individuals receiving services, who resides in a family living home, community home for individuals with an intellectual disability, or host home for children for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.
- Check the box for **individual 18 years or older who resides in the home of a prospective adoptive parent for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.
- Check the **volunteer having direct volunteer contact with children** box if applying for the purpose of volunteering as an adult for an unpaid position as a volunteer with a child-care service, a school, or a program, activity or service as a person responsible for the child's welfare or having direct volunteer contact with children. In addition, check the box of one of the organizations listed, i.e. Big Brother/Big Sister, domestic violence shelter, rape crisis center. If you are **NOT** applying for a volunteer in one of the organizations listed, please check the **other** box and write the name of the organization in the space provided.
- Check the **PA Department of Human Services employment & training program participant** box if you are applying for the purpose of participating in a PA Department of Human Services employment and training program through a county assistance office (CAO) or the Office of Income Maintenance (OIM). The signature **AND** phone number of the CAO or OIM representative is required. If there is no signature and no phone number, your application will be rejected and returned to you.
- If you were provided a "**PAYMENT AUTHORIZATION CODE**" by an organization, please provide the **agency/organization name** in the space provided and the **payment authorization code** in the space provided.
- Please check the **CONSENT/RELEASE OF INFORMATION** box if you included a payment code in the space above and attached the completed Consent/Release of Information Authorization form to your Pennsylvania Child Abuse History Certification application when you mail it to our office. The Consent/Release of Information Authorization form allows the department to send your results to a third party. If the Consent/Release of Information Authorization form is **NOT** attached to the certification application, the results **WILL** be mailed to the applicant's home address and not to the third party.

Applicant Demographic Information:

- Name - Include the applicant's full legal name. Initials are not acceptable for a first name. If your full legal name is an initial, please provide supporting documentation along with your certification application.
- Social Security number - Include the applicant's social security number. A social security number is voluntary; **HOWEVER, PLEASE NOTE THAT APPLICATIONS THAT DO NOT INCLUDE SOCIAL SECURITY NUMBERS MAY TAKE LONGER TO BE PROCESSED.**
- Gender - Please check one box.
- Date of birth - Fill in the applicant's date of birth (Example: 01/22/1990).
- Age - Fill in the applicant's current age.

Address:

- The address listed must be the applicant's current home address. This is also where the results of the certification will be mailed, unless otherwise noted. If the **different mailing address** box is checked and a mailing address is provided in the "different" mailing address column, the results will be mailed to the "mailing" address and not the "home" address. **Note:** If the consent/release of information box is checked and an "other" address is provided, the results will be mailed to the "other" address.

Contact Information:

- Please provide your home, work or mobile telephone number. Fill in the number where the applicant can be reached in the event that there are questions about the information on the application.
- Please provide an email address. By providing an email address, you are consenting to ChildLine contacting you by email in the event that you cannot be reached by phone. **NO CONFIDENTIAL INFORMATION WILL EVER BE SHARED OR PROVIDED IN AN EMAIL FROM OUR OFFICE.**

Previous Names Used Since 1975:

- The applicant must list any and all full legal names that they have ever had since 1975. This includes maiden names, nicknames, aliases and also known as (aka) names.

Previous Addresses Since 1975:

- List all addresses where the applicant has resided since 1975. The applicant can attach an additional sheet of paper with all of the addresses listed if necessary. If the applicant cannot remember the exact mailing addresses since 1975, filling in as much information as possible about the location is acceptable.

Household Members:

- Include anyone that the applicant lived with since 1975 (parents, guardians, siblings, children, spouse (ex), paramour, friends, etc.). In addition, include the household member's relationship to the applicant, their age (to the best of your knowledge) and their gender. If the applicant was under the age of 18 in 1975, this section **MUST** include the applicant's PARENT(S) or GUARDIAN(S). If this section is left blank, the application will be rejected and returned to the applicant.

Signature:

- Applications **MUST** be signed and dated. Applications that are not signed and dated will be rejected and returned to the applicant.

CHILDLINE USE ONLY:

- Please **DO NOT WRITE** in this section. This is for CHILDLINE staff only.

Additional Information:

Applicants can visit <https://www.compass.state.pa.us/CWIS> for more information about submitting the child abuse certification online or to register for a business/organization account.

**PENNSYLVANIA STATE POLICE
REQUEST FOR CRIMINAL RECORD CHECK
1-888-QUERYPA (1-888-783-7972)**

This form is to be completed in ink by the requester – (information will be mailed to the requester only). If this form is not legible or not properly completed, it will be returned unprocessed to the requester. A response may take four weeks or longer.

TRY OUR WEBSITE FOR A QUICKER RESPONSE
<https://epatch.state.pa.us>

REQUESTER NAME	
ADDRESS	
CITY/STATE/ZIP CODE	
TELEPHONE NO. (AREA CODE)	

FOR CENTRAL REPOSITORY USE ONLY CONTROL NUMBER
AFTER COMPLETION MAIL TO: PENNSYLVANIA STATE POLICE CENTRAL REPOSITORY – 164 1800 ELMERTON AVENUE HARRISBURG, PA 17110-9758 DO NOT SEND CASH OR PERSONAL CHECK
CHECK ONE BLOCK <input type="checkbox"/> INDIVIDUAL/NONCRIMINAL JUSTICE AGENCY – ENCLOSE A CERTIFIED CHECK/MONEY ORDER IN THE AMOUNT OF \$22.00, PAYABLE TO: <u>"COMMONWEALTH OF PENNSYLVANIA"</u> THE FEE IS NONREFUNDABLE <input type="checkbox"/> NOTARIZED INDIVIDUAL/NONCRIMINAL JUSTICE AGENCY – ENCLOSE A CERTIFIED CHECK/MONEY ORDER IN THE AMOUNT OF \$27.00, PAYABLE TO: <u>"COMMONWEALTH OF PENNSYLVANIA"</u> THE FEE IS NONREFUNDABLE <input type="checkbox"/> FEE EXEMPT-NONCRIMINAL JUSTICE AGENCY – NO FEE

SUBJECT OF RECORD CHECK				
(FIRST)	(MIDDLE)	(LAST)		
MAIDEN NAME AND/OR ALIASES	SOCIAL SECURITY NUMBER	DATE OF BIRTH (MM/DD/YYYY)	SEX	RACE

The Pennsylvania State Police response will be based on the comparison of the data provided by the requester against the information contained in the files of the Pennsylvania State Police Central Repository only.

**FEEES FOR REQUESTS - \$22.00. NOTARIZED FEE REQUESTS - \$27.00.
MAKE ALL MONEY ORDERS PAYABLE TO: COMMONWEALTH OF PENNSYLVANIA **

REASON FOR REQUEST				
◀◀◀◀◀CHECK THE BOX THAT MOST APPLIES TO THE PURPOSE OF THIS REQUEST▶▶▶▶▶				
<input type="checkbox"/>	INTERNATIONAL ADOPTION - INTERNATIONAL ADOPTION MUST BE NOTARIZED AND MAILED IN. (\$27.00 FOR REQUEST)			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
ADOPTION (DOMESTIC)	EMPLOYMENT	VISA	OTHER	

WARNING: 18 Pa.C.S. 4904(b) UNDER PENALTY OF LAW - MISIDENTIFICATION OR FALSE STATEMENTS OF IDENTITY TO OBTAIN CRIMINAL HISTORY INFORMATION OF ANOTHER IS PUNISHABLE AS AUTHORIZED BY LAW.

ARREST/CONVICTION REPORT AND CERTIFICATION FORM (under Act 24 of 2011 and Act 82 of 2012)

Section 1. Personal Information

Full Legal Name: _____

Date of Birth: ____/____/____

Any former names
by which you have
been identified: _____

Section 2. Report of Arrest or Conviction

By checking this box, I report that I have been arrested for or convicted of an offense or offenses enumerated under 24 P.S. §§1-111(e) or (f.1) ("Reportable Offense(s)"). See Instructions on Page 3 of this Form for a list of Reportable Offenses. If you have none to report, proceed to Section 3 of this form.

Details of Arrests or Convictions

For each arrest for or conviction of any Reportable Offense, specify in the space below (or on additional attachments if necessary) the offense for which you have been arrested or convicted, the date and location of arrest and/or conviction, docket number, and the applicable court.

Section 3. No Arrest or Conviction

By checking this box, I state that I have not been arrested for or convicted of any Reportable Offense.

Section 4. Certification

By signing this form, I certify under penalty of law that the statements made in this form are true, correct and complete. I understand that false statements herein, including, without limitation, any failure to accurately report any arrest or conviction for a Reportable Offense, shall subject me to criminal prosecution under 18 Pa.C.S. §4904, relating to unsworn falsification to authorities.

Signature

Date

INSTRUCTIONS

This standardized form (PDE-6004) has been developed by the Pennsylvania Department of Education, pursuant to 24 P.S. §1-111(j), to be used by current and prospective employees of public and private schools, intermediate units and area vocational-technical schools for the written reporting by current and prospective employees of any arrest or conviction for an offense enumerated under 24 P.S. §§1-111(e) and (f.1).

As required by subsection (j)(2) of 24 P.S. §1-111, this form shall be completed and submitted by all current and prospective employees of a public or private school, intermediate unit or area vocational-technical school. In addition, as required by subsection (j)(4) of 24 P.S. §1-111, this form shall be utilized by current and prospective employees to provide written notice within seventy-two (72) hours after an arrest or conviction for an offense enumerated under 24 P.S. §§1-111(e) or (f.1).

Exemption: Any current employee who completed a PDE-6004 on or before December 27, 2011, in compliance with 24 P.S. §§1-111(j)(1) and (2) on that date, and who has not been arrested for or convicted of an offense enumerated under 24 P.S. §§1-111(e) and (f.1) shall not be required to complete an additional form.

In accordance with 24 P.S. §1-111, employees completing this form are required to submit the form to the administrator or other person responsible for employment decisions in a school entity.

If you have questions regarding to whom the form should be sent, please contact your supervisor or the school entity administration office.

PROVIDE ALL INFORMATION REQUIRED BY THIS FORM LEGIBLY IN INK.

LIST OF REPORTABLE OFFENSES

- **A reportable offense enumerated under 24 P.S. §1-111(e) consists of any of the following:**

- (1) An offense under one or more of the following provisions of Title 18 of the Pennsylvania Consolidated Statutes:

<ul style="list-style-type: none"> ▪ Chapter 25 (relating to criminal homicide) ▪ Section 2702 (relating to aggravated assault) ▪ Section 2709.1 (relating to stalking) ▪ Section 2901 (relating to kidnapping) ▪ Section 2902 (relating to unlawful restraint) ▪ Section 2910 (relating to luring a child into a motor vehicle or structure) ▪ Section 3121 (relating to rape) ▪ Section 3122.1 (relating to statutory sexual assault) ▪ Section 3123 (relating to involuntary deviate sexual intercourse) ▪ Section 3124.1 (relating to sexual assault) ▪ Section 3124.2 (relating to institutional sexual assault) ▪ Section 3125 (relating to aggravated indecent assault) ▪ Section 3126 (relating to indecent assault) ▪ Section 3127 (relating to indecent exposure) ▪ Section 3129 (relating to sexual intercourse with animal) ▪ Section 4302 (relating to incest) ▪ Section 4303 (relating to concealing death of child) 	<ul style="list-style-type: none"> ▪ Section 4304 (relating to endangering welfare of children) ▪ Section 4305 (relating to dealing in infant children) ▪ A felony offense under section 5902(b) (relating to prostitution and related offenses) ▪ Section 5903(c) or (d) (relating to obscene and other sexual materials and performances) ▪ Section 6301(a)(1) (relating to corruption of minors) ▪ Section 6312 (relating to sexual abuse of children) ▪ Section 6318 (relating to unlawful contact with minor) ▪ Section 6319 (relating to solicitation of minors to traffic drugs) ▪ Section 6320 (relating to sexual exploitation of children)
---	---
- (2) An offense designated as a felony under the act of April 14, 1972 (P.L. 233, No. 64), known as “The Controlled Substance, Drug, Device and Cosmetic Act.”
- (3) An offense SIMILAR IN NATURE to those crimes listed above in clauses (1) and (2) under the laws or former laws of:
 - the United States; or
 - one of its territories or possessions; or
 - another state; or
 - the District of Columbia; or
 - the Commonwealth of Puerto Rico; or
 - a foreign nation; or
 - under a former law of this Commonwealth.

- **A reportable offense enumerated under 24 P.S. §1-111(f.1) consists of any of the following:**

- (1) An offense graded as a felony offense of the first, second or third degree, other than one of the offenses enumerated under 24 P.S. §1-111(e), if less than (10) ten years has elapsed from the date of expiration of the sentence for the offense.
- (2) An offense graded as a misdemeanor of the first degree, other than one of the offenses enumerated under 24 P.S. §1-111(e), if less than (5) five years has elapsed from the date of expiration of the sentence for the offense.
- (3) An offense under 75 Pa.C.S. § 3802(a), (b), (c) or (d) (relating to driving under influence of alcohol or controlled substance) graded as a misdemeanor of the first degree under 75 Pa.C.S. § 3803 (relating to grading), if the person has been previously convicted of such an offense and less than (3) three years has elapsed from the date of expiration of the sentence for the most recent offense.



COMMONWEALTH OF PENNSYLVANIA

PUBLIC WORKS EMPLOYMENT VERIFICATION FORM

Date _____

Business or Organization Name (Employer) _____

Address _____

City _____ State _____ Zip Code _____

Contractor

Contracting Public Body _____

Contract/Project No _____

Project Description _____

Project Location _____

As a contractor/subcontractor for the above referenced public works contract, I hereby affirm that as of the above date, our company is in compliance with the Public Works Employment Verification Act ('the Act') through utilization of the federal E-Verify Program (EVP) operated by the United States Department of Homeland Security. To the best of my/our knowledge, all employees hired post January 1, 2013 are authorized to work in the United States.

It is also agreed to that all public works contractors/subcontractors will utilize the federal EVP to verify the employment eligibility of each new hire within five (5) business days of the employee start date throughout the duration of the public works contract. Documentation confirming the use of the federal EVP upon each new hire shall be maintained in the event of an investigation or audit.

I, _____, authorized representative of the company above, attest that the information contained in this verification form is true and correct and understand that the submission of false or misleading information in connection with the above verification shall be subject to sanctions provided by law.

Authorized Representative Signature

MAINTENANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, That we, the undersigned

as Principal and

(Surety Company)

(Address)

a corporation organized and existing under the laws of the State of and authorized to transact business in Pennsylvania, as Surety, are held and firmly bound unto

Reading School District
800 Washington Street
Reading, PA 19601

as hereinafter set forth, in the full and just sum of

_____ 100% base Bid plus accepted Alternate amount
Dollars (\$ _____), for maintenance as designated below; lawful money of the United States of America, to be paid to the Reading School District, its successors or assigns, to which payment, well and truly to be made and done, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

Sealed with our respective seals and dates this _____ day of _____, 20_____.

WHEREAS, the above bounden Principal has entered into a contract (the "Contract") with

Reading School District
800 Washington Street
Reading, PA 19601

dated the _____ day of _____, 20_____ for First and Second Floors HVAC and Electrical Upgrades at the Reading School District Administration Building

upon certain terms and conditions in said Contract more particularly mentioned; and

WHEREAS, it is one of the conditions of the award of the Reading School District, pursuant to which said Contract is about to be entered into, that these presents be executed.

NOW, THEREFORE, the joint and several conditions of this obligation are such:

That, if the above bounden Principal shall remedy without cost to the Reading School District any break of service and/or default of full responsibility for the entire duration of the Warranty Period; provided, in the judgment of the Reading School District or its successor having jurisdiction in the premises, such defects are caused by defective or inferior materials or workmanship, then this part of this obligation shall be void; otherwise, it shall be and remain in full force and effect. For purposes of this Maintenance Bond, the term "Warranty Period" shall mean the two-year period commencing with Substantial Completion (as defined in the Contract Documents). For purposes of this Maintenance Bond the term "Contract Documents" shall

SECTION 01010 - PROJECT SUMMARY

This Project includes:

General, HVAC, Electrical and Plumbing Construction.

The General Contractor is the lead Contractor on this project. The General Contractor is responsible to set up weekly coordination meetings, and create the project schedule. Project meeting may be on site or virtual.

General Construction:

The General Contractor is responsible for all trades coordination and scheduling. Demolition of existing drywall and concealed spline ceilings. New 2x2 ceilings in all areas of the First and Second Floors unless noted otherwise. Demolition of existing partitions. New drywall studed partitions and chases. Painting of all new partitions and chases, First Floor Toilet Room renovation. All labor and miscellaneous materials to perform associated work.

Provide a field site coordination meeting with HVAC Contractor, Electrical Contractor and Plumbing Contractor to locate and final size all chases in the field. (See below regarding Project Schedule and coordination). Refer to Drawings E-1 and E-2 for Project Phasing Plans. **The General Contractor is responsible to provide an on-site foreman daily.**

The General Contractor shall provide physical protection from damage for all existing walls, flooring, desks, miscellaneous room equipment in the South end of the Second Floor rooms. This shall be from Stair B to the exterior south wall of the building.

HVAC Construction:

General Demolition, demolition of existing Unit Ventilator Piping, piping to be drained and abandon unit ventilators in place, installation of new VRF system including all materials and labor. Miscellaneous cutting and patching to perform work. Provide all condensate and refrigerant piping for complete system. Provide all new terminal equipment, boilers, pumps, piping and controls.

The HVAC contractor shall be responsible to provide temporary Air Conditioning for all First and Second floor rooms of the building that are not brought onto the new air conditioning system by May 15th.

Provide a field site coordination meeting with General Contractor, Electrical Contractor and Plumbing Contractor to locate and final size all chases in the field. Cap existing unit ventilator outside air wall openings. Refer to Drawing E-1 and E-2 for Project Phasing Plan.

Electrical Construction:

Electrical Demolition of existing lighting fixtures, wiring, controls, and existing unit ventilators and miscellaneous HVAC/Plumbing equipment. Provide and install all new lighting, wiring and controls. New panels and feeders. Power wiring to all HVAC equipment.

Provide a field site coordination meeting with General Contractor and HVAC Contractor to locate and final size all chases in the field. Cutting and patching to perform his work. New normal emergency lighting circuits. (See above regarding project coordination and schedule). Refer to Drawing E-1 and E-2 for Project Phasing Plan. Removal and replacement of existing ceiling tiles to perform work.

Plumbing Construction:

Plumbing Demolition of existing toilet rooms, provide all water piping, sanitary piping, vent line piping, fittings, insulation, all miscellaneous materials, and labor to install. (See above regarding project coordination and schedule). Refer to Drawing E-1 and E-2 for Project Phasing Plan. Removal and replacement of existing ceiling tiles to perform work.

END OF SECTION 01010

SECTION 01027 - APPLICATIONS FOR PAYMENT

Schedule of Values: Coordinate preparation of the Schedule of Values with the Contractor's Construction Schedule.

Correlate line items in the Schedule of Values with other schedules and forms, including:

- Contractor's Construction Schedule.
- Application for Payment form.
- List of subcontractors.
- List of products.
- Schedule of submittals.

Submit the Schedule of Values to the Engineer at the earliest date, but no later than seven (7) days before the date scheduled for submittal of the initial Application for Payment.

Break Contract Sum down in enough detail to facilitate evaluation of Applications for Payment. Break subcontract amounts down into several line items. Round amounts off to the nearest dollar; the total shall equal the Contract Sum.

For each item where an Application for Payment includes products purchased or fabricated and stored, but not installed, provide separate line items for initial cost, each subsequent stage of completion, and installed value.

Each item in the Schedule of Values and Applications for Payment shall be complete including total cost and share of overhead and profit.

Update and resubmit the schedule when Change Orders or Construction Change Directives change the Contract Sum.

Applications for Payment: Each Application for Payment shall be consistent with previous applications and payments as certified by the Engineer and paid for by the Owner.

Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for the application.

Application Preparation: Complete every entry, including notarization and execution by person authorized to sign on behalf of the Owner. Incomplete applications will be returned without action.

Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the period covered by the application.

Transmittal: Submit 3 executed copies of each application to the Engineer within 24 hours; one copy shall be complete, including waivers of lien and similar attachments.

Transmit each copy with a transmittal listing attachment, and recording information related to the application.

Waivers of Lien: With each application, submit waivers of lien from every entity who may file a lien arising out of the Contract, and related to the Work covered by the payment.

Submit partial waivers on each item for amount requested, prior to deduction for retainage, on each item.

When an application shows completion of an item, submit final or full waivers.

Waiver Delays: Submit each application with Contractor's waiver of lien for the period covered by the application.

Submit final Application for Payment with final waivers from every entity involved with performance of Work covered by the application who could be entitled to a lien.

Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.

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

- List of subcontractors.
- List of suppliers and fabricators.
- Schedule of Values.
- Contractor's Construction Schedule (preliminary if not final).
- Submittal Schedule (preliminary if not final).
- Copies of building permits
- Copies of licenses from governing authorities.
- Certificates of insurance and insurance policies.
- Performance and payment bonds (if required).

Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions. Administrative actions and submittals that precede or coincide with this application include:

- Occupancy permits, if required.
- Warranties and maintenance agreements.
- Test/adjust/balance records.
- Maintenance instructions.
- Meter readings.
- Final cleaning.
- Application for reduction of retainage, and consent of surety.

Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment application include:

- Deduct any unused Allowance included in the Bid Form from the Final Application for Payment.
- Completion of Project closeout requirements.
- Completion of items specified for completion after Substantial Completion.
- Transmittal of required Project construction records to Owner.
- Proof that taxes, fees and similar obligations have been paid.
- As-Built Drawings submitted and approved.

END OF SECTION 01027

SECTION 01040 - PROJECT COORDINATION

This Section specifies requirements for Project coordination including:

- Coordination.
- Administrative and supervisory personnel.
- General installation provisions.
- Cleaning and protection.

Coordination: Coordinate activities included in various Sections to assure efficient and orderly installation of each component. Coordinate operations included under different Sections that are dependent on each other for proper installation and operation.

Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain the best results.

Where space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

Make provisions to accommodate items scheduled for later installation.

Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

Lead Contractor in Charge of Meetings and Scheduling: The General Contractor is in charge of setting up construction meetings, running meetings, writing up project meeting minutes and distributing meeting minutes to all required, creating and following through with the project schedule.

On-Site Chase Coordination Meeting: The General, HVAC and Electrical Contractors shall have an on-site coordination meeting to coordinate the exact size and location of all chases shown on the drawings prior to beginning any work. Piping and electrical conduits need to be discussed to ensure all chases are located and sized properly for future first and second floor renovation.

Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

- Preparation of schedules.
- Delivery and processing of submittals.
- Progress meetings.
- Project closeout activities.

Coordination Drawings: Prepare Coordination Drawings where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.

Show relationship of components shown on separate Shop Drawings.

Indicate required installation sequences.

Inspection of Conditions: The Installer of each component shall inspect the substrate and conditions under which Work is performed. Do not proceed until unsatisfactory conditions have been corrected.

Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that they are more stringent than requirements in Contract Documents.

Inspect material immediately upon delivery and again prior to installation. Reject damaged and defective items.

Provide attachment and connection devices and methods necessary for securing each construction element. Secure each construction element true to line and level. Allow for expansion and building movement.

Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints to obtain the best effect. Refer questionable choices to the Engineer for decision.

Recheck measurements and dimensions, before starting installation.

Install each component during weather conditions and Project status that will ensure the best results. Isolate each part from incompatible material as necessary to prevent deterioration.

Coordinate temporary enclosures with inspections and tests, to minimize uncovering completed construction for that purpose.

Mounting Heights: Where mounting heights are not indicated, install components at standard heights for the application indicated. Refer questionable decisions to the Engineer.

Cleaning and Protection: During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

Limiting Exposures: Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure. Such exposures include:

- Excessive static or dynamic loading.
- Excessive internal or external pressures.
- Excessive weathering.
- Excessively high or low temperatures or humidity.
- Air contamination or pollution.
- Water or ice.
- Chemicals or solvents.
- Heavy traffic, soiling, staining and corrosion.
- Rodent and insect infestation.
- Unusual wear or other misuse.
- Contact between incompatible materials.
- Theft or vandalism.

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

Refer to other Sections of these Specifications, including Divisions -15 and -16, for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

Structural Work: Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Obtain approval of the cutting and patching proposal before cutting and patching structural elements.

Operational and Safety Limitations: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life or safety. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems:

Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

Materials: Use materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose performance will equal or surpass of existing materials.

Inspection: Before cutting, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

Temporary Support: Provide temporary support of Work to be cut.

Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.

Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

Take all precautions to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

Performance: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

Cut existing construction to provide for the installation of other components or the performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review procedures with the original installer; comply with the original installer's recommendations.

Where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

Painting: Where devices and conduit is removed contractor shall be responsible to paint area to match surrounding/adjacent area. Paint color shall match responsible existing as close as possible. Painting new walls installed.

Cleaning: Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove paint, mortar, oils, putty and similar items. Thoroughly clean piping, conduit and similar features before painting or finishing is applied. Restore damaged pipe covering to its original condition.

Fireproofing: Provide fireproofing at all areas pipe or conduit sleeves are added.

END OF SECTION 01045

SECTION 01090 - DEFINITIONS AND STANDARDS

Summary: This Section specifies requirements for compliance with governing regulations, codes and standards. Requirements include obtaining permits, licenses, and inspections, as well as payments, statements and requirements associated with regulations, codes and standards.

Refer to General Conditions, as amended, for requirements for compliance with governing regulations.

Definitions: The following definitions supplement definitions contained in the Agreement, General Conditions and other Contract Documents. They apply generally to the Work.

Indicated refers to graphic representations, notes or schedules on Drawings, or paragraphs or schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help locate the reference.

Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Engineer", "requested by the Engineer", and similar phrases. No implied meaning shall be interpreted to extend the Engineer's responsibility into the Contractor's supervision of construction.

Approve, used in conjunction with action on submittals, applications, and requests, is limited to the Engineer's duties and responsibilities stated in General and Supplementary Conditions. Approval shall not release the Contractor from responsibility to fulfill Contract Document requirements.

Regulation includes laws, ordinances, statutes, and lawful orders of authorities having jurisdiction, and rules, conventions and agreements in the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

Furnish means "supply and deliver, ready for unloading, unpacking, assembly, installation, and similar operations."

Install describes operations at site including "unloading, unpacking, assembly, erection, anchoring, applying, working to dimension, finishing, protecting, cleaning and similar operations."

Provide means "furnish and install, complete and ready for use."

Installer is an entity engaged by the Contractor, an employee, or subcontractor for performance of a particular activity, including installation, erection, and application. Installers shall be experienced in the operations they perform.

The term "Experienced," when used with "Installer" means having a minimum of 5 previous projects similar in size to this Project, and familiar with precautions required, and requirements of the authority having jurisdiction.

Project Site is the space available for construction activities, either exclusively or with others performing other construction on the Project. The extent of the Project Site is shown on the Drawings, and may or may not be identical with the description of the land upon which the Project is to be built.

Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, at the Project Site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.

Language used in the Contract Documents is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words as singular where applicable and the context indicates.

Imperative Language is generally used. Requirements expressed imperatively are to be performed by the Contractor. At certain locations subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or by others when noted.

Assignment of Specialists: Certain construction activities shall be performed by specialists, recognized experts in operations to be performed. Specialists must be engaged for those activities, and these assignments are requirements over which the Contractor has no option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

Drawing Symbols: Graphic symbols on Drawings are recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., seventh edition.

Mechanical/Electrical Drawings: Graphic symbols on mechanical and electrical Drawings are aligned with symbols recommended by ASHRAE. Where appropriate, they are supplemented by symbols recommended by technical associations. Refer instances of uncertainty to the Engineer for clarification before proceeding.

Applicability of Standards: Except where Contract Documents include more stringent requirements, applicable industry standards have the same force and effect as if bound or copied into Contract Documents. Such standards are part of the Contract Documents by reference. Individual Sections indicate which standards the Contractor must keep available at the Project site for reference.

Referenced standards take precedence over standards that are not referenced but recognized in the industry as applicable.

Unreferenced standards are not applicable, except as a general requirement of whether the Work complies with recognized construction industry standards.

Publication Dates: Where compliance with a standard is required, comply with standard in effect as of date of Contract Documents.

Updated Standards: Submit a Change Order proposal where an applicable standard has been revised and reissued after the date of the Contract Documents and before performance of Work. The Engineer will decide whether to issue a Change Order to proceed with the updated standard.

Conflicting Requirements: Where compliance with two or more standards that establish different or conflicting requirements for minimum quantities or quality levels is specified, the most stringent requirement will be enforced. Refer uncertainties as to which quality level is more stringent to the Engineer for a decision before proceeding.

Minimum Quantities or Quality Levels: The quantity or quality shown or specified is the minimum to be provided or performed. Indicated values are minimum or maximum, as appropriate for the requirements. Refer instances of uncertainty to the Engineer for decision before proceeding.

Copies of Standards: Each entity engaged on the Project shall be familiar with standards applicable to that activity. Copies of applicable standards are not bound with the Contract Documents.

Where copies of standards are required, obtain copies directly from the publication source. Although copies of standards needed for enforcement of requirements may be part of submittals, the Engineer reserves the right to require the submittal of additional copies for enforcement of requirements.

Abbreviations and Names: Where acronyms or abbreviations are used in Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

Trade Union Jurisdictions: Maintain, complete current information on jurisdictional matters, regulations and pending actions, as applicable to construction activities. The manner in which Contract Documents have been organized and subdivided is not intended to indicate of trade union or jurisdictional agreements.

Discuss new developments at Project meetings at the earliest feasible dates. Record relevant information and actions agreed upon.

Assign and subcontract construction activities, and employ tradesmen and laborers, in a manner that will not unduly risk jurisdictional disputes that could result in conflicts, delays, claims and losses.

Permits, Licenses, and Certificates: Submit copies of permits, licenses, certifications, inspection reports, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records in conjunction with compliance with standards and regulations bearing on performance of the Work. The Contractor is responsible to pay any fees associated with providing all Permits, License and Certificates including Subcontractors.

END OF SECTION 01090

SECTION 01200 - PROJECT MEETINGS

Summary: This Section specifies requirements for Project meetings including:

Pre-Construction Conferences.
Progress Meetings.
Refer to Section 01040 Project Coordination for additional information.

Pre-construction Conference: The General Contractor shall organize and conduct a pre-construction conference after execution of the Agreement and prior to commencement of construction activities. Review responsibilities and personnel assignments.

Attendees: The Owner, Engineer and their consultants, the Contractor and its superintendent, subcontractors, and other concerned parties shall be represented by persons authorized to conclude matters relating to the Work.

Agenda: Discuss significant items that could affect progress, including the tentative construction schedule, critical sequencing, use of the premises, procedures for processing Change Orders and equipment deliveries.

Pre-installation Conference: Conduct a pre-installation conference before each activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in the installation, and coordination or integration with other materials and installations that have preceded or will follow, shall attend. Advise the Engineer of scheduled meeting dates.

Review progress of other activities and preparations for the activity under consideration at each conference, including time schedules, manufacturer's recommendations, weather limitations, substrate acceptability, compatibility problems and inspection and testing requirements.

Record significant discussions, agreements and disagreements of each conference, along with the approved schedule. Distribute the meeting record to everyone concerned, promptly, including the Owner and Engineer.

Do not proceed if the conference cannot be successfully concluded. Initiate necessary actions to resolve impediments and reconvene the conference at the earliest feasible date.

Progress Meetings: The General Contractor shall organize and conduct progress meetings at regular intervals. Notify the Owner and Engineer of scheduled dates. Coordinate meeting dates with preparation of the payment request.

Attendees: The Owner and Engineer, each subcontractor, supplier or other entity concerned with progress or involved in planning, coordination or performance of future activities shall be represented by persons familiar with the Project and authorized to conclude matters relating to progress.

Agenda: Review minutes of the previous progress meeting. Review significant items that could affect progress. Include topics appropriate to the current status of the Project.

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

Review the present and future needs of each entity present, including such items as:

- Time.
- Sequences.
- Deliveries.
- Off-site fabrication problems.
- Site utilization.
- Temporary facilities and services.
- Hazards and risks.
- Quality and Work standards.
- Change Orders.
- Documentation of information for payment requests.

Reporting: No later than 5 days after each meeting, distribute copies of minutes of the meeting to each party present and to parties who should have been present. Include a summary, in narrative form, of progress since the previous meeting.

END OF SECTION 01200

SECTION 01210 – ALLOWANCES

Summary: Section includes administration and procedural requirements for allowance included in the Project.

All allowance in this Project shall be considered labor and material allowances.

Refer to Division 01 Section “Unit Prices” for procedures for using Unit Prices.

Use allowances only as directed by Engineers for Owner’s purpose.

At Project closeout, credit unused amounts remaining in allowances to owner by Change Order.

The Contractor shall adjust allowance amounts and maintain a spread sheet of approved allowance for use by the Engineer. Contractor shall submit allowance spread sheet with each Application for Payment when the Contractor is requesting for work of an approved allowance.

Schedule of Allowances:

GENERAL CONSTRUCTION ALLOWANCES

- GC 1 Include 300 square feet of Replacement of Existing AC Tile Spline Ceiling with new Acoustical Tile Ceiling Type in accordance with Unit Price GC 1.
- GC 2 Include 300 square feet of Replacement of Existing Drywall Ceiling with new Acoustical Tile Ceiling Type in accordance with Unit Price GC 2.
- GC 3 Include 500 square feet of Painting in accordance with Unit Price GC 3.

HVAC CONSTRUCTION ALLOWANCES

- HVAC 1 Include 160’-0” of 1 1/8” Refrigerant Piping in accordance with Unit Price HVAC 1.
- HVAC 2 Include 160’-0” of refrigerant piping in accordance with Unit Price HVAC 2.
- HVAC 3 Include 160’-0” of 12” X 8” Ductwork in accordance with Unit Price HVAC 3.

ELECTRICAL CONSTRUCTION ALLOWANCES

- EC 1 Include twenty (20) 120volt circuits in accordance with Unit Price EC 1.
- EC2 Include fifteen (15) Type “A” light fixtures in accordance with Unit Price EC 2.
- EC3 Include ten (10) Occupancy sensors in accordance with Unit Price EC 3.

PLUMBING CONSTRUCTION ALLOWANCES

- PC 1 Include twenty 20’-0” of 1” copper water piping in accordance with Unit Price PC 1.
- PC 2 Include 20’-0” of 4” Cast Iron Sanitary piping in accordance with Unit Price PC 2.

END OF SECTION 01210

SECTION 01230 - ALTERNATE BIDS

This Section specifies administrative and procedural requirements for alternates.

Definitions:

Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding documents, that will be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed or in the products, materials, equipment, systems or installation methods described in the Contract Documents. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the alternate into the work.

Alternate prices shall be all inclusive of the cost of materials, work, profit, supervision, administration and any and all costs in connection therewith for the work in place, accepted or omitted as the cause may be, and shall hold for the same period as the bid.

Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into the Project. Include as part of each alternate, miscellaneous devices, accessories, and similar items incidental to or required for a complete installation whether or not indicated as part of the alternate.

Each Alternate price filled in on the Bid Form shall include all costs of related coordination, modification or adjustment required to perform the Work of that Alternate.

If, after award of the Contract, additional details, drawings, and/or data are required or requested by and furnished to the Contractor to supplement the original intent of the Alternate, such additional details, drawings and data shall be true developments of the Alternate Price work as shown on the Contract Documents, or as herein described, and no claims shall be made for any additional cost as a result of such additional details, drawings and/or data which may result from the acceptance of any of the Alternates.

Schedule of Alternates:

ALTERNATE BID M-1 VRF System - (Trane/Mitsubishi)

State the costs to be added to, or deducted from the base bid to use Trane/Mitsubishi VRF system in lieu of the base bid Daiken System. Alternate manufacturer must meet all specifications of the BASE BID. Equipment, capacities and "electrical" characteristics must meet the values listed in the contract documents. Should electrical characteristics increase (circuit breaker, disconnect, wire and conduit size) as part of this alternate the Mechanical Contractor shall be responsible to provide those costs as part of his bid.

ALTERNATE BID M-2 VRF System - (JCI/Hatachi)

State the costs to be added to, or deducted from the base bid to use JCI/Hatachi VRF system in lieu of the base bid Daiken System. Alternate manufacturer must meet all specifications of the BASE BID. Equipment, capacities and "electrical" characteristics must meet the values listed in the contract documents. Should electrical characteristics increase (circuit breaker, disconnect, wire and conduit size) as part of this alternate the Mechanical Contractor shall be responsible to provide those costs as part of his bid.

ALTERNATE BID M-3 (BAS Control Integration)

State the costs to be added to the base bid to provide control system provided by JCI. The JCI control system shall fully integrate with the VRF control panel specified with this project as well as the existing Daikin panel for the third floor. The HC will have to include in this alternate replacing the existing communication card in the existing Daikin panel. In addition, JCI will provide a separate DDC control panel, (BACnet/IP), for secondary systems including, but not limited to, unit heaters, cabinet heaters, convectors, pump status, boiler status and duct heaters. Under this alternate the new JCI panel will replace the existing secondary DDC panel which serves the third- floor secondary systems. These points will need to be wired to the new JCI panel. JCI will include all programming and graphics required.

ALTERNATE BID P-1 (Hardwired Flush Valves and Faucets)

State the costs to be added to, or deducted from the base bid to provide "Hardwired" Flush Valves and Faucets in lieu of the base bid Battery operated devices.

ALTERNATE BID E-1 (Hardwired Flush Valves and Faucets)

State the costs to be added to the base bid to provide "Hardwired" Flush Valves and Faucets in lieu of the base bid Battery operated devices.

END OF SECTION 01230

SECTION 01235 – UNIT PRICES

This Section specifies administrative and procedural requirements for unit prices.

Definitions: Unit price is the amount proposed by bidders, as indicated on the bid form. The unit price is the amount per unit of measurement or quantity for materials, equipment or services that maybe added to or deducted from the contract sum by change order in the event the quantities of work indicated in the contract documents are increased or decreased.

All unit prices are to include the total cost including delivery, installation, insurance bond costs testing programming's, supervision, and all other costs.

The undersigned agrees that the following shall constitute the unit prices for each Project to be applicable to additions to or deductions from the quantities contemplated by the Contract Documents by reason of changes to the Contract Documents in the course of performance of the contemplated work:

Schedule of Unit Prices: All Unit Price shall assume system is installed and complete.

GENERAL CONSTRUCTION UNIT PRICES

- GC 1 Replace Existing AC Tile Spline Ceiling: Provide the total cost per square foot to completely remove and dispose of existing acoustical tile spline-mounted ceiling system including all supports and hangers and to furnish and install 2x2 mineral fiber tile ceiling panels, grid hangers and accessories as specified in Division 09 Section "Acoustical Panel Ceilings."

- GC 2 Replace Existing Drywall Ceiling: Provide the total cost per square foot to completely remove and dispose of existing gypsum wallboard ceiling system including all framing and supports and to furnish and install 2x2 mineral fiber tile ceiling panels, grid, hangers and accessories as specified in Division 09 Section "Acoustical Panel Ceilings."

- GC 3 Latex Paint on Drywall GWB Walls: Provide the total cost per square foot to paint gypsum wallboard or plaster with acrylic latex paint as specified in Division 09 Section "Painting and Finishing".

HVAC CONSTRUCTION UNIT PRICES

- HVAC 1 1 1/8" Refrigerant Piping: Provide the total cost to install 20'-0" of 1 1/8" refrigerant piping with pipe insulation (as specified) and six (6) pipe elbows in accordance with specifications. Provide all miscellaneous materials and labor.

- HVAC 2 1 1/2" Condensate Piping: Provide the total cost to install 20'-0" of 1 1/2" condensate drain pipe with insulation (as specified) and six (6) elbows. Provide all miscellaneous materials and labor.

- HVAC 3 12" x 8" Sheet Metal Ductwork: Provide the total cost to install 20'-0" of 12" x 8" sheet metal ductwork insulated (as specified) with (1) elbow fitting. Provide all miscellaneous materials and labor.

ELECTRICAL CONSTRUCTION UNIT PRICES

- EC 1 120 Volt Circuit: Provide the total cost to provide a 120volt, 1P-20A circuit with 150'-0" of 2#12w/#12grd. with connections. Provide 1P-20A circuit breaker. Provide all required labor for install.
- EC 2 Type "A" Light Fixture: Provide the total cost to provide (1) Type "A" light fixture with 30'-0" of 2#12w/#12grd. with Lutron Pico dimmer switch, Pico power supply and 30'-0" of low voltage wiring and all connections. Provide all miscellaneous materials and labor for install.
- EC 3 Ceiling Occupancy Senor: Provide the total cost to provide (1) ceiling mounted low voltage Lutron Pico occupancy sensor with connections. Provide all miscellaneous materials and labor.

PLUMBING CONSTRUCTION UNIT PRICES

- PC 1 1" Copper Water Piping: Provide 10'-0" of 1" copper water pipe with two (2) fittings and required labor for installation.
- PC 2 4" Sanitary Piping: Provide 10'-0" of 4" cast iron sanitary pipe with two (2) fittings and labor required for installation.

END OF SECTION 01235

SECTION 01300 - SUBMITTALS

Summary: This Section specifies requirements for handling submittals. **All Equipment and Material submittals are due to the Engineer within two (2) weeks after Project award.**

General Procedures: Coordinate submittal preparation with performance of construction activities, and with purchasing or fabrication, delivery, other submittals and related activities. Transmit in advance of performance of related activities to avoid delay.

Coordinate transmittal of different submittals for related elements so processing will not be delayed by the need to review concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination until related submittals are received.

Submittal Preparation: Place a label or title block on each submittal for identification. Provide a 4" x 5" space on the label or beside the title block on Shop Drawings to record Contractor's review and approval markings and action taken. Include the following information on the label for processing and recording action taken.

- Project name.
- Date.
- Name and address of Engineer.
- Name and address of Contractor.
- Name and address of subcontractor.
- Name and address of supplier.
- Name of manufacturer.

Submittal Transmittal: Package submittals appropriately for transmittal and handling. Transmit with a transmittal form. Submittals received from other than the Contractor will be returned without action.

Contractor's Construction Schedule: Submit a fully detailed construction schedule, within 10 days of the date established for Commencement of the Work. Provide a line item for each construction activity. Use the breakdown of units of Work as indicated in the "Schedule of Values".

Secure commitments for performing critical construction operations from parties involved. Coordinate each activity with other activities and show in proper sequence; include minor elements involved in the construction sequence. Indicate sequences necessary for completion of related portions.

Coordinate the Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests and other schedules.

Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the Schedule to allow time for the Engineer's procedures necessary for certification of Substantial Completion.

Submittal Schedule: Submit the Submittal Schedule within 10 days of the Construction Schedule. Coordinate the Schedule with the list of subcontracts, Schedule of Values and list of products as well as the Construction Schedule.

Prepare the Schedule in chronological order; include submittals. Provide the following information:

- Scheduled date for the first submittal.
- Related Section number.

Name of subcontractor.
Description of the construction element covered.
Scheduled date the Engineer's final release or approval.

Distribution of Schedules: Distribute copies of the Construction and Submittal Schedules to the Engineer, Owner, subcontractors, and other parties required to comply with scheduled dates. When revisions are made, distribute to the same parties and post in the same locations.

Updating: Revise each Schedule after each meeting or activity, where revisions have been made. Issue the updated Schedules concurrently with report of each meeting.

Shop Drawings: Submit new information, drawn to accurate scale. Indicate deviations from Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Shop drawings for all Equipment and Materials shall be submitted with 2-weeks of notice to proceed. Include the following information:

- Dimensions.
- Identification of products and materials included.
- Notation of coordination requirements.
- Notation of dimensions established by field measurement.

Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".

Initial Submittal: Submit one correctable translucent print and one blue-line print for review; the reproducible print will be returned.

Final Submittal: Submit 3 blue-line prints; if the Drawing is required for maintenance manuals submit 5 prints. 2 prints will be retained; the remainder will be returned. One of the prints returned shall be maintained as a "Record Document".

Do not use Shop Drawings without a final stamp indicating action taken in connection with construction.

Product Data: Collect Product Data into a single submittal for each element or system. Mark each copy to show applicable choices and options.

Where Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

- Manufacturer's printed recommendations.
- Compliance with recognized trade association standards.
- Compliance with recognized testing agency standards.
- Application of testing agency labels and seals.
- Notation of dimensions verified by field measurement.
- Notation of coordination requirements.

Preliminary Submittal: Submit a preliminary single-copy where selection of options is required.

Submittals: Submit 3 copies of each required submittal; submit 6 copies for maintenance manuals. The Engineer will retain one, and will return the other marked with action taken and corrections or modifications required.

Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

Distribution: Furnish copies of final submittal to installers, and others required for performance of construction activities. Show distribution on transmittal forms. Do not proceed with installation until an applicable copy of Product Data is in the installer's possession.

Do not permit use of unmarked copies of Product Data in connection with construction.

Distribution: Prepare additional sets for subcontractors, manufacturers, fabricators, installers, and others as required for performance. Show distribution on transmittal forms.

Engineer's Action: Except for submittals for record, information or similar purposes, where action and return are required, the Engineer will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.

Action Stamp: The Engineer will stamp each submittal with a self-explanatory action stamp. The stamp will be appropriately marked to indicate action taken.

END OF SECTION 01300

SECTION 01600 - MATERIALS AND EQUIPMENT

"Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.

"Named Products" are items identified by manufacturer's product name, including make or model designation indicated in the manufacturer's product literature.

"Materials" are products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

"Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

When the Contractor has the option of selecting between two or more products, the product selected shall be compatible with products previously selected.

Nameplates: Except for required labels and operating data, do not attach manufacturer's nameplates or trademarks on surfaces exposed to view in occupied spaces or on the exterior.

Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an inconspicuous accessible surface. The nameplate shall contain the following information and essential operating data:

- Name of product and manufacturer.
- Model and serial number.
- Capacity.
- Speed.
- Ratings.

Product Storage, and Handling: Store and handle products in accordance with manufacturer's recommendations, using methods that will prevent damage, deterioration and loss.

Coordinate delivery to minimize long-term storage and prevent overcrowding construction spaces. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

Inspect products on delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

Store products to facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the structure in a manner that will not endanger supporting construction.

There will be "no" on site storage for this Project unless noted during the pre-bid to accept on site storage.

Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

Non-Proprietary Specifications: When Specifications list products or manufacturers that are available and may be used, but do not restrict the Contractor to use of these products only, the Contractor may propose any product that complies with Contract requirements. Comply with provisions for "substitutions" to obtain approval for use of an unnamed product.

Descriptive Specification Requirements: Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the characteristics and otherwise complies with requirements.

Compliance with Standards: Where Specifications require compliance with a standard, select a product that complies with the standard specified.

Installation of Products: Comply with manufacturer's instructions and recommendations for installation of products. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

SECTION 01700 - PROJECT CLOSEOUT

Substantial Completion: Substantial completion for this Project is **October 31, 2022**. Before requesting inspection for certification of Substantial Completion, complete the following:

In the Application for Payment that coincides with the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed substantially complete.

Submit specific warranties, maintenance agreements, final certifications and similar documents.

Submit record drawings, maintenance manuals, final Project photographs, damage or settlement survey, property survey, and similar record information.

Complete start-up testing of systems, and instruction of the Owner's personnel. Remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

Complete final clean up. Touch-up and repair and restore marred exposed finishes.

Inspection Procedures: On receipt of a request for inspection, the Engineer will proceed or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.

Results of the completed inspection will form the basis of requirements for final acceptance.

Final Acceptance: Before requesting inspection for certification of final acceptance and final payment, complete the following:

Submit final payment request with releases.

Submit a final statement, accounting for changes to the Contract Sum.

Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance

Submit consent of surety to final payment.

Submit evidence of continuing insurance coverage complying with insurance requirements.

Reinspection Procedure: The Engineer will reinspect the Work upon receipt of notice that the Work has been completed, except items whose completion has been delayed because of circumstances acceptable to the Engineer.

Upon completion of reinspection, the Engineer will prepare a certificate of final acceptance, or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

If necessary, reinspection will be repeated.

Record Document Submittals: Do not use Record Documents for construction purposes; protect from loss in a secure location; provide access to Record Documents for the Engineer's reference.

Record Drawings (As-Built): Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark-up these drawings to show the actual installation. Mark whichever drawing is most capable of showing conditions accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover.

Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in actual Work performed in comparison with the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot be readily discerned later by direct observation. Note related record drawing information and Product Data.

Upon completion of the Work, submit record Specifications to the Engineer for the Owner's records.

Maintenance Manuals: Organize maintenance data into sets of manageable size. Provide the number of copies as specified in section 01300. Bind in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

- Emergency instructions.
- Spare parts list.
- Copies of warranties.
- Wiring diagrams.
- Recommended "turn around" cycles.
- Inspection procedures.
- Shop Drawings and Product Data.

Operating and Maintenance Instructions: Arrange for the manufacturer's recognized representative of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Include a detailed review of the following:

- Maintenance manuals.
- Spare parts and materials.
- Tools.
- Lubricants.
- Control sequences.
- Hazards.
- Warranties and bonds.
- Maintenance agreements and similar continuing commitments.

As part of instruction for operating equipment, demonstrate the following procedures:

- Start-up and shutdown.
- Emergency operations.
- Noise and vibration adjustments.
- Safety procedures.

Provide a video of the above demonstrations to be turned over to the owner for his use as needed.

Final Cleaning: Employ experienced workers for final cleaning. Clean each surface to the condition expected in a commercial building cleaning and maintenance program. Complete the following before requesting inspection for certification of Substantial Completion:

Remove labels that are not permanent labels.

Clean exposed hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication.

Clean the site of rubbish, litter and other foreign substances. Sweep paved areas; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

Removal of Protection: Remove temporary protection and facilities.

Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION 01700

SECTION 01740 - WARRANTIES AND BONDS

Standard Product Warranties are pre-printed written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

Special Warranties are written warranties required by or incorporated in Contract Documents, to extend time limits provided by standard warranties or to provide greater rights for the Owner.

Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Contractor.

Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

Replacement Cost: On determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through part of its useful service life.

Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

Rejection of Warranties: The Owner reserves the right to reject warranties and limit selections to products with warranties not in conflict with requirements of the Contract Documents.

The Owner reserves the right to refuse to accept Work where a special warranty, or similar commitment is required, until evidence is presented that the entities required to countersign commitments are willing to do so.

Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties on the Engineer's request.

When a designated portion of the Work is completed and occupied or used, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Engineer within fifteen days of completion of that designated portion of the Work.

When a special warranty is to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Engineer for approval prior to final execution.

Special warranty forms are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer. Submit a draft to the Owner through the Engineer for approval prior to final execution.

Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

Provide heavy paper dividers with celluloid covered tabs for each warranty. Mark the 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 the installer.

Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.

When operating and maintenance manuals are required for warranted construction, provide additional copies of each warranty, as necessary, for inclusion in each required manual.

END OF SECTION 01740

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Division 01 Section "Cutting and Patching" for cutting and patching requirements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. Predemolition Photographs or Video: Submit before Work begins.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Contractor shall arrange to shut off indicated services/systems as required by the performance of the work.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PROTECTION

- A. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
- B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 4. Maintain fire watch during and for at least 4 hours after flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 8. Dispose of demolished items and materials legally and promptly.
- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.

- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
- D. Glazing: Remove glazing from framing prior to removing.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 03 54 16 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans indicating substrates, locations, and average anticipated depths of underlayment based on field survey of substrate conditions.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

1.5 QUALITY ASSURANCE

- A. Product Compatibility: Manufacturers of underlayment and floor-covering systems shall certify in writing that products are compatible.
- B. Installer Qualifications: Installer shall be approved by manufacturer for application of underlayment products required for this Project.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.
- B. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 HYDRAULIC CEMENT UNDERLAYMENTS

- A. Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Basis of Design: Subject to compliance with requirements, hydraulic cement underlayment incorporated into the project shall be based on systems as follows:
 - a. ARDEX Americas; "V 1200™" for use to level subfloor to comply with flooring manufacturer's requirements.
 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. Custom Building Products; CustomTech™.
 - b. Laticrete International, Inc.; Supercap.
 - c. Master Builders Solutions; MasterTop.
 3. Cement Binder: ASTM C150/C150M, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.
 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C109/C109M.
- B. Water: Potable and at a temperature of not more than 70 deg F.
- C. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- E. Corrosion-Resistant Coating: Recommended in writing by underlayment manufacturer for metal substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of the Work.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 500 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test, ASTM F1869: Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours. Comply with manufacturer's requirements if they are more stringent.
- C. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 INSTALLATION

- A. Mix and install underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after installation recommended in writing by manufacturer.
 - 2. Coordinate installation of components to provide optimum adhesion to substrate and between coats.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Install underlayment to produce uniform, level surface with feathered edges to match adjacent floor elevations as follows:
 - 1. Install underlayment at all irregularities, depressions, etc. and as required by flooring manufacturer's requirements on all new concrete surfaces indicated to receive flooring.
 - 2. Install underlayment on all existing concrete surfaces indicated to receive new flooring.
 - 3. Final layer shall be installed without aggregate to produce surface.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 INSTALLATION TOLERANCES

- A. Finish and measure surface, so gap at any point between gypsum cement underlayment surface and an unlevelled, freestanding, 10-foot-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch and 1/16 inch in 2 feet.

3.5 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 03 54 16

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Face brick.
 - 3. Mortar and grout.
 - 4. Masonry joint reinforcement.
 - 5. Ties and anchors.
 - 6. Embedded flashing.
 - 7. Miscellaneous masonry accessories.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 - 1. Face brick.
 - 2. Weep vents.
- D. Samples for Verification: For each type and color of the following:
 - 1. Face brick.

2. Colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For firms indicated in "Quality Assurance Article."
- B. Material Certificates: For each type and size of the following:
 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C 67.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent testing agency acceptable to the authorities having jurisdiction, qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- E. Preconstruction Testing Service: The contractor or manufacturer shall engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by the contractor or manufacturer. Retesting of materials failing to meet specified requirements shall be done at contractor's expense.
 1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.

2. Mortar Test: For mortar properties per ASEM C 270.
3. Grout Test: For compressive strength per ASTM C 1019.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
 1. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and as follows:
 - a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 100 deg F.

- b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 100 deg F. Heat grout materials to produce grout temperatures between 40 and 100 deg F. Maintain mortar and grout above freezing until used in masonry.
 - c. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 100 deg F. Heat grout materials to produce grout temperatures between 40 and 100 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F if grouting. Use heat on both sides of walls under construction.
 - d. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 100 deg F. Heat grout materials to produce grout temperatures between 40 and 100 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.
 2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:
 - a. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.
 - b. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.
 - c. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.
 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.
 2. Do not apply mortar to substrates with temperatures of 100 deg F and above.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide bullnose units for outside corners unless otherwise indicated.

- B. Concrete Masonry Units (CMUs): ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
 - 2. Density Classification: Lightweight
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Exposed Faces: Provide uniform texture type, aggregate size and mix ratio adjusted to provide an extremely fine smooth face texture free of fissures, voids and other defects.
 - 5. Products: Subject to compliance with requirements, provide concrete masonry units from one of the following manufacturers:
 - a. Anchor Block Company.
 - b. Carlisle Concrete Products
 - c. Eastern Industries, Inc.
 - d. Fizzano Brothers Concrete Products, Inc.
 - e. Keystone Block & Supply Co., Inc.
 - f. Standard Concrete Products Co., Inc.
 - g. Terre Hill Concrete Products.

2.3 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

- B. Face Brick: Facing brick complying with ASTM C 216.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Match existing color, texture and size.
 - 2. Grade: SW.

3. Type: FBS.
4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi.
5. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
6. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
7. Size: Match existing units.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color selected to match existing mortar.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Davis Colors; "True Tone Mortar Colors."
 - b. Lanxess Corporation; "Bayferrox Iron Oxide Pigments."
 - c. Solomon Colors, Inc.; "SGS Mortar Colors."
- E. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 1. Colored Portland Cement-Lime Mix:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Capital Materials Corporation; "Riverton Portland Cement Lime Custom Color."
 - 2) Holcim (US) Inc.; "Rainbow Mortamix Custom Color Cement/Lime."
 - 3) Lafarge North America Inc.; "Eaglebond Portland & Lime."
 - 4) Lehigh Cement Company; "Lehigh Custom Color Portland/Lime Cement."
 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 3. Pigments shall not exceed 10 percent of portland cement by weight.
- F. Aggregate for Mortar: ASTM C 144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. White-Mortar Aggregates: Natural white sand or crushed white stone.

3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Aggregate for Grout: ASTM C 404.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); "Accelguard 80."
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; "Morset."
 - c. Sonneborn Products, BASF Aktiengesellschaft; "Trimix-NCA."
 - I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ACM Chemistries; "RainBloc for Mortar."
 - b. BASF Aktiengesellschaft; "Rheopel Mortar Admixture."
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; "Dry-Block Mortar Admixture."
 - J. Water: Potable.

2.5 REINFORCEMENT

- A. Basis of Design: Subject to compliance with requirements, Masonry Joint Reinforcement incorporated into the project shall be based on products manufactured as follows:
- a. Single Wythe Wall: Hohmann & Barnard, Inc.; "#120 Truss Mesh."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from other manufacturers that meet or exceed the published data of the specified Basis of Design product.
- C. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
1. Interior and Exterior Walls: Hot-dip galvanized, carbon steel.
 2. Wire Size for Side Rods: 0.148-inch diameter.
 3. Wire Size for Cross Rods: 0.148-inch diameter.
 4. Wire Size for Veneer Ties: 0.148-inch diameter.
 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- D. Masonry Joint Reinforcement for Single-Wythe Masonry: Truss type with single pair of side rods.

2.6 TIES AND ANCHORS

- A. Basis of Design: Subject to compliance with requirements, Ties and Anchors incorporated into the project shall be based on products as manufactured by as follows, in sizes as required by project conditions:
1. Masonry to Masonry Wall Ties: Hohmann & Barnard, Inc.; "MWT-Mesh Wall Tie."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from other manufacturers that meet or exceed the published data of the specified Basis of Design product.
- C. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
 3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- E. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
 2. Where wythes do not align or are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
 3. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire.

2.7 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.8 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Requirements are specified in Division 07 Section "Sheet Metal Flashing and Trim."
1. Stainless Steel-Laminated Flashing: 3 oz/sq.ft. stainless steel core with polymer fabric laminated to one stainless steel face with non-asphalt adhesive.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) York Manufacturing, Inc.; "Multi-Flash SS."

- 2) STS Coatings, Inc.; "Gorilla Flash Stainless Fabric."
- b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by the flashing manufacturer.
- 2. Metal Drip Edge: 3 inch wide with ½-inch, 30 degree hemmed drip, Type 304 or 316 stainless steel drip plate edge with continuous 1/8-inch strip of factory installed compressible foam.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hohmann & Barnard, Inc.; "DP-FTS" and "DP-FTS-LB."
- B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- C. Weep/Vent Products: Use the following unless otherwise indicated:
 - 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Advanced Building Products Inc.; "Mortar Maze Weep Vent."
 - 2) Blok-Lok Limited; "Cell-Vent."
 - 3) Dayton Superior Corporation, "Dur-O-Wal Division; Cell Vents."
 - 4) Heckmann Building Products Inc.; "No. 85 Cell Vent."
 - 5) Hohmann & Barnard, Inc.; "Quadro-Vent."
 - 6) Wire-Bond; "Cell Vent."

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
- B. Basis of Design: Subject to compliance with requirements, Masonry Cleaners incorporated into the project shall be based on products as follows:

1. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching: ProSoCo, Inc.; "Sure Klean No. 600 Detergent."
2. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining: ProSoCo, Inc.; "Sure Klean No. 101 Lime Solvent."
3. Cleaners for Brick Subject to Metallic Staining: ProSoCo, Inc.; "Sure Klean Vana Trol."

C. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:

1. Diedrich Technologies, Inc.
2. EaCo Chem, Inc.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type S.
3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.
4. For interior non-load-bearing partitions, Type S.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required.

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Face brick, if required to match existing mortar.

D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
 - a. Face brick, if required to match existing mortar.

E. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Do not install unit masonry that is damaged, cracked or has chipped corners. Remove and replace any unit masonry that contain these issues.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
 1. Tooth new masonry units into existing masonry units.
- G. Do not wet CMUs.

3.3 SPECIAL UNIT MASONRY PROJECT TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/4 inch or minus 1/8 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/4 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/8 inch in a story height or 1/4 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 5 feet or 1/4 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 3/16 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
5. For lines and surfaces do not vary from straight by more than 3/16 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 3/16 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.
6. For exposed bed joints interrupted by control or expansion joints, bed joint line and level shall not vary by more than 1/8" inch.

D. Masonry installations that do not conform to the Special Unit Masonry Tolerances indicated above shall be removed and reinstalled.

3.4 LAYING MASONRY WALLS

- #### A.
- Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- B. Bond Pattern for Exposed Masonry: Match existing.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
 - 5. In accordance with the Special Unit Masonry Project Tolerances listed in this Section.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
 - 1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
 - 1. Masonry joints above ceilings shall be struck flush starting two masonry courses above ceiling.

3.6 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to masonry backup with masonry-veneer anchors to comply with the following requirements:
 - 1. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weeps in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.
 - 3. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
 - 4. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing ½-inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.

C. Install vents in head joints in exterior wythes at spacing indicated. Use specified vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.
2. Space vents 16 inches o.c. unless otherwise indicated.

3.9 REPAIRING, POINTING, CLEANING, AND PROTECTION

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units or installations out of compliance with the Special Unit Masonry Project Tolerances indicated in this Section. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

1. Contractor shall identify and replace units noted above as part of their quality control program. Architect reserves the right to back charge Contractor for their time to identify masonry units if Contractor fails to identify and replace non-compliant installations.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.10 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Masonry Waste Recycling: Return broken CMU's not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 20 00

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Interior trim.
- 2. Simulated stone, including solid polymer and quartz countertops and other simulated stone fabrications.
- 3. Shelving.
- 4. Miscellaneous finished carpentry.

- B. Related Requirements:

- 1. Division 06 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
- 2. Division 09 Section "Painting and Finishing" for priming, backpriming and staining of interior finish carpentry.
- 3. Division 12 Section "Plastic-Laminate-Faced Casework" for stock-designed cabinets and accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, details of joints, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures. Provide complete sample box with all colors and patterns from price ranges specified included for selection.

D. Samples for Verification:

1. For each species and cut of lumber and panel products with transparent, non-transparent, or non-factory-applied finish, with ½ of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.
2. Exposed cabinet hardware.
3. Plastic laminate, quartz, for each type, color, pattern, and surface finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For each type of product.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finish carpentry to include in maintenance manuals. Include product data for use and care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm experienced in successfully producing finished carpentry similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- C. Installer Qualifications: Arrange for installation of finished carpentry by a firm that can demonstrate successful experience in installing finished carpentry and solid surfacing items similar in type and quality to those required for this project.
- D. AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI) except as otherwise indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Deliver finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

- C. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes. Do not store stone on site until area for stone is ready for installation.
 - 1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
 - 2. Store stone on wood A-frames or pallets with non-staining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

1.8 FIELD CONDITIONS

- A. Field Measurements: Where finish carpentry is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.
 - 1. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with manufacture of woodwork without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.
- B. Established Dimensions: Where countertops and assemblies are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- D. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and the following grading rules:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
 - 2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."

3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
 4. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
 5. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
 6. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."
- B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- C. Softwood Plywood: DOC PS 1.
- D. Hardboard: AHA A135.4.

2.2 INTERIOR TRIM

- A. Hardwood Lumber Trim for Transparent Finish (Stain).
1. Species and Grade: White Maple; NHLA.
 2. Maximum Moisture Content: 10 Percent.
 3. Finger Jointing: Not Allowed.
 4. Gluing for Width: Use for lumber trim wider than 6 inches.
 5. Veneered Material: Use for lumber trim wider than 6 inches.
 6. Face Surface: Surfaced (smooth).
 7. Matching: Selected for compatible grain and color.
- B. Lumber Trim for Opaque Finish (Painted Finish):
1. Species and Grade: Eastern white pine, Finish or 1 Common; NeLMA or NLGA.
 2. Species and Grade: B Finish; NHLA.
 3. Maximum Moisture Content: 15 percent.
 4. Finger Jointing: Not allowed.
 5. Face Surface: Surfaced (smooth).
- C. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.
1. Hardwood Moldings: WMMPA HWM 2, P-grade.
 - a. Species: Aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar.
 - b. Maximum Moisture Content: 9 percent.
 2. Finger Jointing: Not allowed.

2.3 PLASTIC-LAMINATE-FACED CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the “Architectural Woodwork Standards” for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
- B. Refer to Division 12 Section “Plastic-Laminate-Faced Casework” for requirements.

2.4 SIMULATED STONE COUNTERTOPS AND FABRICATIONS

- A. Solid Polymer-Surface-Material Fabrications:
 - 1. Configuration: Provide the following style:
 - a. Other Fabrications: As indicated on Drawings.
 - b. Match existing threshold.
- B. Quartz Countertops and Fabrications:
 - 1. Configuration: Provide countertops with the following front and backsplash style:
 - a. Front: 1-1/2-inch laminated, 1/8-inch radius edge.
 - b. Other Fabrications: As indicated on Drawings.
 - 2. Countertops: 3/4-inch-thick, quartz with front edge built up with same material.
 - 3. Backsplashes: 3/4-inch-thick, quartz
 - 4. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz manufacturer’s written instructions for adhesives, sealers, fabrication, and finishing.
 - a. Fabricate with loose backsplashes for field assembly.
- C. Countertop Materials:
 - 1. Quartz: Solid sheet consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the “Physical Characteristics of Materials” Article of ANSI SS1.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cambria.
 - 2) Color Quartz.
 - 3) Daltile One Quartz Surfaces.
 - 4) DuPont Corian Quartz.
 - 5) Meganite Inc.
 - 6) Wilsonart.
 - b. Colors and Patterns: As selected by Architect from manufacturer’s full range equal to DuPont & Company’s Price Groups, Category A through E. For purposes of bidding, Category E shall be included in the bid. A credit shall be provided should a lesser price group be selected.

2.5 SHELVING

- A. Wood Shelving: Made from one of the following materials as indicated on the Drawings, 3/4 inch thick.
 - 1. Wood boards as specified above for hardwood lumber trim finished as indicated on the Drawings.
- B. Shelf Brackets: BHMA A156.16, B04041; prime-painted formed steel.
- C. Standards for Adjustable Shelf Brackets: BHMA A156.9, B04102; powder-coat-finished steel.

2.6 MISCELLANEOUS FINISHED CARPENTRY

- A. General: Fabricate miscellaneous finished carpentry indicated on the Drawings, in accordance with this Section for work including, but not limited to:
 - 1. Window.
 - 2. Threshold.

2.7 MISCELLANEOUS MATERIALS

- A. Fasteners for Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

2.8 FABRICATION

- A. Back out or kerf backs of the following members except those with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius unless noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.
- C. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by countertop Installer for anchoring countertops. Furnish installers of other work with Drawings or templates showing locations of these items.
- D. Before installing stone countertops, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES FOR COUNTERTOPS

- A. Variation from Level: Do not exceed 1/8 inch in 96 inches, ¼ inch maximum.
- B. Variation in Joint Width: Do not vary joint thickness more than one-fourth of nominal joint width.
- C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch difference between planes of adjacent units.
- D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.5 CABINET INSTALLATION

A. Simulated Stone Countertops and Fabrications Installation:

1. Install countertops and fabrications level to a tolerance of 1/8 inch in 8 feet.
2. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - a. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - b. Seal edges of cutouts in particleboard subtops by saturating with varnish.

3.6 SHELVING INSTALLATION

- A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.
- B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c.
 1. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing. Remove adhesive that is squeezed out after fastening shelf cleats in place.
- C. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c., unless noted otherwise on Drawing. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- D. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches o.c.
- E. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.
 1. Fasten shelves to cleats with finish nails or trim screws, set flush.

3.7 ADJUSTING

- A. Replace finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.
- B. Clean, lubricate and adjust hardware.

3.8 CLEANING

- A. Clean finish carpentry on exposed and semiexposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.
- B. Remove and replace stone countertops of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
 - 2. Defective countertops.
 - 3. Defective joints, including misaligned joints.
 - 4. Interior stone countertops and joints not matching approved Samples and mockups.
 - 5. Interior stone countertops not complying with other requirements indicated.
- C. Replace in a manner that results in stone countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

3.9 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 20 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Latex joint sealants.
 - 2. Mildew-resistant joint sealants.

1.3 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, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- B. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.6 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.

1.7 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.

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. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Construction Chemicals - Building Systems;"MasterSeal NP520".
 - b. Pecora Corporation; "AC-20".
 - c. Sherwin-Williams Company (The); "950A Siliconized Acrylic Latex Caulk".
 - d. Tremco Incorporated; "Tremflex 834".
 - e. Sherwin Williams; "SherMax Acrylic".
 - 2. Joint Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 3. Joint Locations:
 - a. Control joints on exposed surfaces of walls.
 - b. Perimeter joints between interior wall surfaces and frames of doors, windows, and other openings.

2.3 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) and as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute 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.

2.4 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: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; "786-M White".
 - b. GE Silicones; "SCS1700 Sanitary".
 - c. Sika Corporation U.S.; "Bondaflex Sil 100 WF".
 - d. Pecora Corporation; "898 NST".
 - e. Sherwin Williams Company (The); "White Lightning Silicone All Purpose Sealant".
 - f. Tremco Incorporated; "Tremsil 200".
 - 2. Joint Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

3. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints in toilet rooms, showers, kitchens, and serving areas.
 - c. Other joints in similar conditions noted above.

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 C1193 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 Nonsag 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 C1193 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.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes hollow-metal doors, frames and accessories.
- B. Related Requirements:
 - 1. Division 04 Section "Unit Masonry" for anchoring and grouting hollow metal frames set in masonry construction.
 - 2. Division 08 Section "Door Hardware" for door hardware for hollow-metal doors.
 - 3. Division 08 Section "Flush Wood Doors."
 - 4. Division 09 Section "Painting and Finishing" for finishing.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or 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.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, 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 anchorages, joints, field splices, and connections.
 7. Details of accessories.
- C. Schedule: Provide a schedule of hollow-metal work 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 work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work 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, provide products by one of the following:
1. Ceco Door Products; an Assa Abloy Group company.
 2. Curries Company; an Assa Abloy Group company.
 3. Pioneer Industries, Inc.
 4. Republic Doors and Frames.
 5. Steelcraft; an Ingersoll-Rand company.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Frames:
 - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - b. Construction: Full profile welded.
 - 3. Exposed Finish: Prime.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.4 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. Frame Anchors: 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.

- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. 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.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

2.5 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 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. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. 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.

- c. Compression Type: Not less than two anchors in each frame.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- D. 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 nontemplated, 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.

2.6 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.

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 nontemplated, 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 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. At fire-rated openings, install frames according to NFPA 80.
 - b. 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.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 - 4. 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.

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. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Solid-core doors with wood-veneer faces.
- 2. Factory finishing flush wood doors.
- 3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

- 1. Division 08 Section "Hollow Metal Doors and Frames" for door frames.
- 2. Division 08 Section "Door Hardware" for door hardware for flush wood doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction and factory-finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

- 1. Dimensions and locations of blocking.
- 2. Dimensions and locations of mortises and holes for hardware.
- 3. Dimensions and locations of cutouts.
- 4. Undercuts.
- 5. Requirements for veneer matching.
- 6. Doors to be factory finished and finish requirements.
- 7. Fire-protection ratings for fire-rated doors.

- C. Samples for Initial Selection: For factory-finished doors. Provide full color selection and actual finish samples on wood species specified as selected by Architect from full selection.

D. Samples for Verification:

- 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
- 2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.

- a. Provide Samples for each species of veneer and solid lumber required.
- b. Provide Samples for each color, texture, and pattern of plastic laminate required.
- c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 1. Review specification requirements.
 2. Review installation procedures.
 3. Inspect project conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and the temperature and relative humidity have been stabilized and will be maintained in accordance with manufacturer's requirements.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Algoma Hardwoods, Inc.
 - 2. Eggers Industries.
 - 3. Graham Wood Doors; an Assa Abloy Group company.
 - 4. Lambton Doors.
 - 5. Masonite Architectural
 - 6. VT Industries, Inc.

- B. Source Limitations: Obtain flush wood doors indicated to be blueprint matched with paneling and wood paneling from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

- B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

- C. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208. Grade LD-2.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.
 - b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. 5-inch x 18 inch lock blocks at recessed pulls.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium.
 - 2. Species: Match existing.
 - 3. Cut: Match existing.
 - 4. Match between Veneer Leaves: Book match or match existing.
 - 5. Assembly of Veneer Leaves on Door Faces: Balance match or match existing.
 - 6. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
 - 7. Construction: Five (5) plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
 - 8. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 FACTORY FINISHING

- A. Factory finish doors where indicated in schedules or on Drawings as factory finished.
- B. Transparent Finish:
 - 1. Type: TR-6 catalyzed polyurethane.
 - 2. Staining: As selected by Architect from manufacturer's full range.
 - 3. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.

- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Door hardware for swinging doors.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames".
 - 2. Division 08 Section "Flush Wood Doors".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 1. Provide complete manufacturer's catalog cuts for each item scheduled.
- B. Samples for Initial Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.
- C. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - 2. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents, in vertical format (horizontal format will not be reviewed).
 - 3. Content: Include the following information:

- a. Identification number, location, hand, fire rating, size, and material of each door and frame.
- b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
- c. Complete designations, including name and manufacturer, type, style, function, size, swing, quantity, function, and finish of each door hardware product.
- d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
- e. Fastenings and other pertinent information.
- f. Explanation of abbreviations, symbols, and codes contained in schedule.
- g. Mounting locations for door hardware.
- h. List of related door devices specified in other Sections for each door and frame.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For electrified door hardware, from the manufacturer.
 - 1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
- C. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

- A. Manufacturer's data for each piece of hardware.
- B. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- C. Installation instructions for each piece of hardware for each door.
- D. Final, as-built copy of hardware and keying schedule.
- E. Warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
 - B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- 1.8 COORDINATION
- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
 - B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Manual Closers: 10 years from date of Substantial Completion.

1.10 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Follow-Up Services: The hardware installer shall confirm, in writing, the operation of all door hardware is within tolerances prior to the General Contractor requesting Substantial Completion. In addition to warranty service required for issues realized post-occupancy during the warranty period, the installer shall re-review the operation of all door hardware ten months after Substantial Completion and shall make all adjustments required.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum

requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

- C. Basis of Design: Hardware scheduled in Part 3 "Door Hardware Schedule" shall be considered the Basis of Design product. Acceptable manufacturers listed in this Part shall provide products that meet or exceed the published data of the Basis of Design product where their product is provided in lieu of the Basis of Design product.

2.2 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. IVES Hardware; an Allegion company.
 - c. McKinney Products Company; an ASSA ABLOY Group company.
 - d. Stanley Commercial Hardware; a dormakaba company.

2.3 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - b. DORMA Architectural Hardware; a dormakaba company.
 - c. LCN Closers; an Allegion company.
 - d. Norton Door Controls; an ASSA ABLOY Group company.
 - e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - f. Stanley Commercial; a dormakaba company.

2.4 DOOR SILENCERS

- A. Door Silencers: BHMA A 156.16; rubber door silencer.
 - 1. Basis of Design: Subject to compliance with requirements, Door Silencers incorporated into the project shall be based on products as follows:
 - a. Rockwood Manufacturing Company, an ASSA ABLOY Group company; "608".

2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. IVES Hardware, an Allegion Company.
 - b. Hager Company.

2.5 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. IVES Hardware; an Allegion company.
 - b. Hager Companies.
 - c. National Guard Products, Inc.
 - d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - e. Reese Enterprises, Inc.
 - f. Zero International; an Allegion brand

2.6 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. Rockwood; an ASSA ABLOY Group company.
 - c. Stanley Commercial Hardware; a dormakaba company.
 - d. Allegion.

2.7 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware or is indicated as a required use of through bolts. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt. Where through bolts are utilized, provide finish-threaded caps to fully conceal nuts.
 - a. Steel through bolts required at the following locations (no exceptions):
 - 1) Door closers at all locations.
 - 2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
 - 4. Self-drilling "Tek" type screws are not acceptable. Use only fasteners supplied by hardware manufacturer.
 - 5. Where it is not possible to reinforce substrate adequately for screws, use through-bolts with sleeves or use sex bolts.
 - a. Do not use where head or nut would be exposed on face of door, unless specifically indicated or made necessary by other requirements.
 - b. Finish exposed heads and nuts the same as hardware on that side of the door.
 - 6. Use expansion shield anchors in concrete and masonry.

2.8 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Frames: For surface applied door hardware, drill and tap frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Use manufacturers supplied installation templates.
 - 2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Closers:

1. Install door closer mounting brackets, arms, plates, and miscellaneous equipment as necessary to mount all door closers inside room, or out of corridor at every instance where a door closer is specified. No door closers (nor parts, nor accessories of) shall be visible from corridor side unless Architect has authorized specific and formal approval for that mounting application, and has clear understanding closer is visible through lite, and has approved such.
 2. Install top jamb mounted units where hardware schedule lists closer functions that are not available in regular arm mounting configurations.
 3. Thru-bolt all closers to doors with sex bolts. Install aluminum spacers for all 5th and 6th bolts at arm connections to metal head frames, and notify frame suppliers to install reinforcing plates to receive all bolts including 5th and 6th bolts.
 4. Where any portion of the back of the closer is visible through glazing, a finish closure panel shall be installed.
- E. Stops: Provide wall stops for doors unless floor or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- F. Door Silencers: Furnish at all hollow metal and wood frames. Each door leaf shall be supplied with three (3) bumpers each side. Do not provide on doors with sound seals or on exterior doors.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Prior to Occupancy Adjustment: Adjust door closers to overcome air pressure produced by HVAC systems. If HVAC pressure, whether negative or positive, negates proper operation or function of any closing or latching device, or inhibits manufacturer's intended performance (in any manner), supplier shall inform the GC in writing that type of hardware cannot operate nor function as manufacturer has designed and tested due to HVAC condition.
- C. Post Occupancy Adjustment: Review operation of door hardware six to eight weeks after Substantial Completion in the presence of the Owner's Representative. Adjust hardware as required to ensure proper operation.
1. Contractor will be required to re-visit site to adjust hardware omitted from onsite review.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

- A. Door hardware shall be furnished and installed using products indicated in schedule on Drawings as the Basis-of-Design.

END OF SECTION 08 71 00

SECTION 09 21 00 – ACOUSTICAL INSULATION AND SEALANT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Mineral wool board insulation.
- B. Related Sections:
 - 1. Division 09 Section "Non Structural Metal Framing."
 - 2. Division 09 Section "Gypsum Board."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 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.

PART 2 - PRODUCTS

2.1 MINERAL-WOOL INSULATION BATTS

- A. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Basis of Design: Subject to compliance with requirements, Mineral-Wool Insulation Batts incorporated into the project shall be based on Owens Corning Thermafiber® SAFB™ FF as manufactured by Thermafiber, Inc. an Owens Corning company.
 - a. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer and product, Contractor may provide products from one of the following manufacturers that meets or exceeds the published data of the specified Basis of Design product.
 - 1) Johns Manville; a Berkshire Hathaway company.
 - 2) Rockwool International.
 2. Flame-Spread Index: 0 when tested in accordance with ASTM E84.
 3. Smoke-Developed Index: 0 when tested in accordance with ASTM E84.
 4. NFPA Class A rated interior finish.
 5. Density: 2.5 pcf.
 6. Validated by UL as formaldehyde-free.
 7. Provide all accessories required to install and secure insulation batts in wall framing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- 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. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF ACOUSTICAL INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

- B. Mineral-Fiber Insulation Batts: 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. Provide metal straps or other materials necessary to keep insulation from sagging in the framed cavity.

END OF SECTION 09 21 00

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General 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 gypsum board assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies.
- B. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.

PART 2 - PRODUCTS

2.1 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: Comply with ASTM C 645; roll-formed from hot-dipped galvanized steel; complying with ASTM A 1003/A 1003M and ASTM A 653/A 653M G40 (Z120) or having a coating that provides equivalent corrosion resistance. A40 galvanized products are not acceptable.
- B. Studs and Runners: ASTM C 645. Use either steel studs and runners or "EQ" Equivalent Gauge steel studs and runners where required for STC indicated.

1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0296 inch.
 - b. Depth: As indicated on Drawings.
 2. Dimpled Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.033 inch.
 - b. Depth: As indicated on Drawings.
 3. Basis of Design: Subject to compliance with requirements, provide products based on products as manufactured by:
 - a. ClarkDietrich Building Systems.
 4. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from another manufacturer that meet or exceed the published data of the specified Basis of Design manufacturer.
- C. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.0296 inch.
 2. Depth: As indicated on Drawings.

2.2 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

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 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 supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 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.
- 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 (runners) 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 penetrating partitions above ceiling.
 - 1. 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.
- E. Direct Furring:
 - 1. Screw to wood framing.
 - 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.
- 2. Tile backing panels.

- B. Related Requirements:

- 1. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
- 2. Division 09 Section "Acoustical Insulation and Sealant" for acoustical insulation and sealants used for STC-rated assemblies and acoustically-treated assemblies.
- 3. Division 09 Section "Painting and Finishing."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Samples: For the following products:

- 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

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 recommendations, 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, those that are moisture damaged, and those that are 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. Moisture- and Mold-Resistant Assemblies: Provide and install moisture- and mold-resistant glass-mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C 1396 and ASTM C 1658 where indicated on Drawings and in all locations which might be subject to moisture exposure during construction.

2.2 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers for the following products listed:
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch unless indicated otherwise.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
 - 3. Products:
 - a. CertainTeed Corporation; "Regular X Gypsum Board."
 - b. National Gypsum Company; "Gold Bond Gypsum Board."
 - c. USG Corporation; "SHEETROCK Brand Gypsum Panels."
 - 4. Locations: Walls, soffits, etc., not noted to be another gypsum board product elsewhere in this section or on the Drawings.
- C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Thickness: 5/8 inch, regular type.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
 - 4. Products:
 - a. Georgia Pacific Gypsum; "Tough Rock Fireguard Mold Guard".
 - b. American Gypsum; "M-Bloc with Mold and Moisture Resistance."
 - c. CertainTeed Corporation; "M2Tech Moisture and Mold Resistant Gypsum Board."

- d. National Gypsum Company; "Gold Bond BRAND XP Gypsum Board."
 - e. USG Corporation; "SHEETROCK Brand Mold Tough Gypsum Panels."
5. Locations: Toilet Rooms Sinks Janitor and as indicated on drawings.

2.3 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. L-Bead: L-shaped; exposed long flange receives joint compound.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
- 1. Interior Gypsum Board: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
- 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
- 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- 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.
- D. Acoustical Insulation: As specified in Division 09 Section "Acoustical Insulation and Sealant."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. 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.
- C. 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.
- D. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. 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.
- E. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- F. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Single-Layer Application:
 - 1. 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.
2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLATION OF TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Tile Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 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 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.
 2. L-Bead: Use where edge trim can only be installed after gypsum panels are installed.

3.6 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: Panels that are substrate for tile.
 3. Level 3: For concealed areas of fire-resistive-rated assemblies, sound rated assemblies, areas receiving heavy-textured finish.
 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Division 09 Section "Painting & Finishing."

3.7 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.

END OF SECTION 09 29 00

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Porcelain tile.
- 2. Stone thresholds.
- 3. Metal edge strips.

- B. Related Requirements:

- 1. Division 06 Section "Finish Carpentry" for solid polymer thresholds.
- 2. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
 - 3. Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Warranty: Special Warranty.
 - 1. Provide letter certifying substrate, setting materials, and grout are compatible with specified warranty.
- C. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- D. Product Certificates: For each type of product.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer has successfully completed similar installations and can demonstrate knowledge of the requirements of ANSI 108, ANSI 118, ANSI 136, ANSI 137, and current Tile Council of North America requirements. Provide references for five (5) similar projects completed in the last three (3) years.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.10 WARRANTY

- A. Special Warranty: Provide a complete system warranty for ceramic tile installation to be free of setting material failure that causes cracks or deterioration in ceramic tile system.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.3 TILE PRODUCTS

- A. Ceramic Tile Type: Glazed porcelain tile.
 - 1. Basis of Design: Subject to compliance with requirements, Porcelain Tile incorporated into the project shall be based on products as follows:
 - a. Dal-Tile; Portfolio, Volume 1.0, or Santino.
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - 3. Certification: Tile certified by the Porcelain Tile Certification Agency.
 - 4. Face Size: 12 by 24 inches.
 - 5. Thickness: 3/8 inch.
 - 6. Face: Plain with square edges.
 - 7. Tile Color, Glaze, and Pattern: As selected by Architect from manufacturer's full range.
 - 8. Grout Color: As selected by Architect from manufacturer's full range.
 - 9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cap: Surface bullnose, module size 6 by 12 inches.
 - b. Wainscot Cap: Surface bullnose, module size 4 by 18 inches.
 - c. External Corners: Surface bullnose, module size same as adjoining flat tile.
 - d. Internal Corners: Field-buttet square corners.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products "Wonderboard."
 - b. United States Gypsum Company "DUROCK Cement Board."
 - 2. Thickness: 5/8 inch.

2.5 SETTING MATERIALS

A. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas; "ARDEX X77 MICROTEC Fiber Reinforced Tile & Stone Mortar."
 - b. Custom Building Products; "Pro-Lite."
 - c. Laticrete International, Inc; "255 Multi--Max."
 - d. MAPEI Corporation "Ultralite."
2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4 and A118.15.
4. For wall and floor applications for LFT (Large Format Tile), provide a medium bed thin-set mortar with non-sagging capability in addition to the requirements in ANSI A118.4 and A118.15.

2.6 GROUT MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas; "ARDEX WA High Performance, 100% Solids Epoxy Grout & Adhesive."
 - b. Custom Building Products; "Ceg-Lite."
 - c. Laticrete International, Inc.; "Spectra Lock Pro."
 - d. MAPEI Corporation; "Kera Poxy."
 - e. Summitville Tiles, Inc.
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, Anodized Aluminum; stainless-steel, ASTM A 666, 300 Series exposed-edge material.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Basis of Design: Product(s) as indicated on Drawings.
 - b. Blanke Corporation.
 - c. Ceramic Tool Company, Inc.
 - d. Schluter Systems L.P.

- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

- B. Add materials, water, and additives in accurate proportions.

- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 2. Verify that concrete substrates for tile wall installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.

4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Porcelain Tile: 1/8 inch.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Thresholds: Install thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).
- I. Metal Edge Strips: Install where exposed edge of tile wall meets other wall that finishes flush with or below top of tile and no threshold is indicated.

3.4 TILE BACKING PANEL INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Wall Installations, Furring:

- 1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: Porcelain tile.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: Water-cleanable epoxy grout.

END OF SECTION 09 30 13

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.3 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices". Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.4 ALLOWANCES

- A. Work Included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of these quantities shall be computed using the Unit Prices stated on the Bid Form. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, minimum 6 inches in size of specified acoustical panel and 8 inch long samples of moldings and suspension systems.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Manufacturer's certification that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material shall carry an approved independent laboratory classification.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.8 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. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.9 QUALITY ASSURANCE

- A. Source Limitations: Obtain each set of linear metal pans and suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.
- B. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials, as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical ceiling area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Installer Qualifications: Firm with not less than 3 years of successful experience in installation of acoustical ceilings similar to requirements for this project and has a successful record of installation in accordance with the manufacturer's installation requirements.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages that indicate UL classification on product label. Store acoustical panels, suspension-system components and accessories in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace acoustical panel ceiling components that fail in materials or workmanship within the specified warranty period:
 - 1. Failures include, but are not limited to, the following:
 - a. Acoustical panels that sag, warp or growth of mold or mildew on panels to resist antimicrobial growth.
 - b. Grid: Rust and manufacturer's defects.
 - 2. Warranty Period: As indicated for each product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

- D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
- E. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANELS

- A. Manufacturers: Provide products by the manufacturer in the following sections:
- B. Mineral Fiber: Provide panels complying with ASTM E 1264 as follows:
 - 1. Material: Wet Formed Mineral Fiber; Type III, Form 2, Pattern C E.
 - 2. Texture: Medium.
 - 3. Finish: Factory-applied Latex paint.
 - 4. Edge Profile: Square, Lay-in.
 - 5. Thickness: $\frac{3}{4}$ ".
 - 6. Color: White.
 - 7. Light Reflectance: .84.
 - 8. Noise Reduction Coefficient: .70.
 - 9. Warranty Period: 10 years.
 - 10. Product:

- a. Armstrong: "Cortega "770" (non-fire-resistance rated).

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

2.5 METAL SUSPENSION SYSTEM

- A. Manufacturers: Provide product by the following:
 - 1. Armstrong World Industries, Inc.

- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges. Main beams and cross tees shall have rotary stitching.
 - 1. Structural Classification: Heavy-duty system.
 - 2. Face Design: Flat, flush.
 - 3. Cap Material: Steel cold-rolled sheet.
 - 4. Cap Finish: Painted white to match ceiling tile.
 - 5. Warranty: 10 years.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.
- B. Coordination: Perform the following prior to installing ceiling grid:
 - 1. Review reflected ceiling plans, lighting plans, ductwork plans, sprinkler shop drawings, electrical systems plans, coordination drawings, and other applicable project drawings prior to installing ceilings.
 - 2. Confirm ceiling elevations and main runner locations with all Contractors with work located in or above the ceiling.
 - 3. Report any conflicts promptly to the Architect in writing.
 - 4. Proceed with grid installation only after all conflicts have been resolved. Conflicts realized during installation will require removal and reinstallation of the ceiling grid at the Contractors expense.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 7. Do not attach hangers to steel deck tabs.
 - 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - 9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 - 10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- D. After installation of suspension-system, acoustical panels shall not be installed until after Architect has performed above ceiling inspection and all deficiencies have been rectified. Acoustical ceiling panels installed prior to this shall be removed at the Contractors expense.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 16 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes vinyl sheet flooring and integral cove base.
- B. Related Sections:
 - 1. Division 03 Section "Hydraulic Cement Underlayment" for leveling compound.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of flooring. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- C. Samples for Initial Selection: For each type of resilient sheet flooring indicated.
- D. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch sections of each different color and pattern of resilient sheet flooring required.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- E. Welded-Seam Samples: For seamless-installation technique indicated and for each resilient sheet flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of resilient sheet flooring 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. Resilient Sheet Flooring: Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each type, color, and pattern of flooring 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 resilient sheet flooring installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient sheet flooring 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 rolls upright.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive resilient sheet flooring 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 F or more than 95 deg F.
- C. Close spaces to traffic during resilient sheet flooring installation.
- D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.
- E. Install resilient sheet flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 UNBACKED VINYL SHEET FLOORING

- A. Basis of Design: Subject to compliance with requirements, Unbacked Vinyl Sheet Flooring incorporated into the project shall be based on systems as follows:
 - 1. Armstrong Flooring, Inc.; "Medintech."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - 1. Forbo Industries, Inc.
 - 2. Johnsonite; A Tarkett Company.
 - 3. Mannington Mills, Inc.
 - 4. Toli International.
- C. Product Standard: ASTM F 1913.
- D. Thickness: 0.080 inch.
- E. Wearing Surface: Smooth.
- F. Sheet Width: As standard with manufacturer.
- G. Seamless-Installation Method: Heat welded.
- H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Blended hydraulic-cement-based formulation as indicated in Division 03 Section "Hydraulic Cement Underlayment" provided or approved by resilient sheet flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.
- C. Seamless-Installation Accessories:
 - 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Color: Match flooring.
 - 2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
- D. Integral-Flash-Cove-Base Accessories:

1. Cove Strip: 1-inch radius provided or approved by resilient sheet flooring manufacturer.
2. Cap Strip: Square metal, provided or approved by resilient sheet flooring manufacturer.
3. Corners: Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.

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 sheet flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
 4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound as specified in Division 03 Section "Hydraulic Cement Underlayment"; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient sheet flooring until it is the same temperature as the space where it is to be installed.
 - 1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 RESILIENT SHEET FLOORING INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient sheet flooring.
- B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.
- C. Lay out resilient sheet flooring as follows:
 - 1. Maintain uniformity of flooring direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
 - 3. Match edges of flooring for color shading at seams.
 - 4. Avoid cross seams.
- D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.
- H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

- I. Seamless Installation:
 - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
- J. Integral-Flash-Cove Base: Cove resilient sheet flooring 4 inches up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt at top against cap strip.
 - 1. Install metal corners at inside and outside corners.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.
- B. Perform the following operations immediately after completing resilient sheet flooring installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 09 65 16

SECTION 09 91 00 – PAINTING AND FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General 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 substrates.
- B. Related Requirements:
 - 1. Requirements for preparing, priming, painting, and finishing are included throughout the specifications. All specification sections shall be reviewed for painting and finishing requirements.

1.3 DEFINITIONS

- A. Gloss Level 1 (Matte Flat Finish): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2 (Velvet-Like Flat Finish): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3 (Eggshell Finish): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4 (Satin Finish): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5 (Semi-Gloss Finish): 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6 (Gloss Finish): 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7 (High-Gloss Finish): More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.

1. Submit manufacturer's standard "fan deck" of colors.
2. Architect will request Samples for Verification after receipt of manufacturer's "fan deck."

C. 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.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.
5. Architect will furnish color schedule approximately 10 weeks after receipt of samples and other color-dependent submittals of other specification sections.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

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.

1. Paint: 10 percent, but not less than 2 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

1.7 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 with manufacturer's data.
2. Remove rags and waste from storage areas daily.
3. Protect product from freezing.

1.8 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 in rain, snow, fog, mist, or when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Where moisture is present, the general contractor shall provide the necessary ventilation to establish appropriate condition. Should the surface be too dry for the product application, the painting contractor shall provide the necessary methods to establish the appropriate conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. The Sherwin Williams Company (SW).
 - 2. PPG PAINTS Architectural Coatings (PPG).

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.
- C. Colors: As selected by Architect from manufacturer's full range.
 - 1. Interior Work: A maximum of 4 different pigmented colors will be used, with variations for trim, wall surfaces, wainscots, and graphics.
 - 2. Dark Tones: A maximum of 2 dark tones will be used as accent colors for the interior.
- D. Multiple Colors: Each room or space may have walls of more than one color. The right is reserved to vary the color after the first coat.
- E. Color Guarantee: Painting Contractor shall guarantee all in-place paint and stain colors to match colors selected. Obtain copies of standard color charts used, and be certain all in-place paint and stain colors closely match selected colors. Surfaces which fail to pass color inspection shall be repainted at no additional cost to Owner.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If

paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.

2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

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. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- 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. General: All areas listed in the Room Finish Schedule as receiving paint (i.e. walls, ceilings, etc.) shall be inclusive of all non-factory finished surfaces. All costs of preparation, cleaning, protection, priming, finishing, cleaning, etc. shall be included for all surfaces (wall, trim, moldings, frames, etc.) and materials (metal, wood, CMU, plaster, gypsum board, etc.) unless specifically noted otherwise. All work shall be in accordance with these Specifications and instructions in the Contract Documents.
- B. Comply with manufacturer's written instructions and recommendations in "MPI Manual" and "Maintenance & Repainting Manual" as applicable to substrates indicated.

- C. 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.
- D. 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.
 - 2. Clean existing surfaces of residue and miscellaneous applied finishes to provide a properly prepared surface to receive new finish.
 - 3. Spackle holes, depressions and imperfections on existing gypsum board, concrete and plaster surfaces as recommended by manufacturer to provide a uniform surface to receive new finish.
- E. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- H. Wood Substrates for Staining and Finishing:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 - 3. Sand surfaces that will be exposed to view and dust off.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and according to recommendations in "MPI Manual."
 - 1. Materials shall be applied with roller or brush, except that spraying will be permitted for items such as mechanical equipment, grilles, or similar items. Mask off adjoining areas not receiving a spray finish against overspray.
 - 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 existing surfaces painted previously or on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
 - a. Spot prime where required or provide alternative preparation product as recommended by manufacturer.
- B. Apply stains and finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for finish and substrate indicated.
 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. If, in the opinion of the Architect, adequate block filler, primer, paint or coating coverage is not provided, Contractor shall apply additional coats to satisfy Architect, at no additional cost to the Owner.
- D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. Apply paints, stains and finishes 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.
- F. Paint exposed surfaces whether or not colors are designated in "schedules", except where natural finish of materials is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas. If color or finish is not designated, Architect will select these from standard colors available for materials systems specified.

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 AND FINISHING SCHEDULE

A. Concrete and Masonry Substrates:

1. Interior, Latex, Non-Traffic Surfaces: Gloss Level 3

- | | | | |
|----|-----|---|--|
| a. | SW | Filler (masonry):
Primer (concrete):
1st coat:
2nd coat: | PrepRite Block Filler (B25W25)
Loxon Masonry Primer
ProMar 200 Zero VOC
ProMar 200 Zero VOC |
| b. | PPG | Filler (masonry):

Primer (concrete):

1 st coat:
2 nd coat: | SPEEDHIDE Hi Fill Latex Block Filler 6-15X1 Series

SEAL GRIP Acrylic Universal Primer 17-921 Series
SPEEDHIDE Zero 6-4310XI Series
SPEEDHIDE Zero 6-4310XI Series |

B. Metal Substrates:

1. Interior, Ferrous Metals, Latex: Gloss Level 5

- | | | | |
|----|-----|--|---|
| a. | SW | Primer*:
1 st coat:
2 nd coat: | DTM Primer / Finish
DTM Acrylic Finish
DTM Acrylic Finish |
| b. | PPG | Primer*:
1 st coat:
2 nd coat: | Pitt Tech Plus DTM Industrial Primer 4020
Pitt Tech Plus Industrial DTM 4216 Series
Pitt Tech Plus Industrial DTM 4216 Series |

*Spot prime where metals are shop coated or primed

C. Wood Substrates: (Exclude shelving at janitor closet)

1. Interior, Polyurethane Stain Coating System: Gloss Level 4

- | | |
|--------------|--|
| Wood Filler: | Wood Filler |
| 1st coat: | MinWax Performance Series Wood Stain 250 VOC |
| 2nd coat: | MinWax Fast Drying Polyurethane (gloss, semi-gloss or satin) |
| 3rd coat: | Polyurethane |

D. Gypsum Board and Plaster Substrates:

- 1. Interior, Latex Paint System: Gloss Level 3
 - a. SW Primer: ProMar 200 Zero VOC Primer
1st coat: ProMar 200 Zero VOC
2nd coat: ProMar 200 Zero VOC

 - b. PPG Primer: SPEEDHIDE Zero Primer 6-4900XI
1st coat: SPEEDHIDE Zero 4310XI Series
2nd coat: SPEEDHIDE Zero 4310XI Series

END OF SECTION 09 91 00

SECTION 10 14 23 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Panel signs.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Product Schedule: For panel signs. Use same designations indicated on Drawings or specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

- A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, Panel Signs incorporated into the project shall be based on products as follows:
 - a. Mohawk Sign Systems, Inc.; "200A Sand Carved" Series.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - 1. APCO Graphics, Inc.
 - 2. Best Sign Systems, Inc.
 - 3. Clarke Systems.
 - 4. Diskey Architectural Signage Inc.
 - 5. Gemini Industries.
 - 6. GPP-Charleston Industries.
 - 7. InPro Corporation (IPC).
 - 8. Nelson-Harkins Industries.

- C. Laminated-Sheet Sign: Sandblasted polymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
 - 1. Composite-Sheet Thickness: Manufacturer's standard for size of sign, minimum 0.125 inch.
- D. Sign-Panel Perimeter: Finish edges smooth.
 - 1. Edge Condition: Square cut.
 - 2. Corner Condition in Elevation: Square.
- E. Mounting: Manufacturer's standard method for substrates indicated with countersunk flathead stainless steel torx fasteners.
- F. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.
 - 1. Font: Helvetica.
- G. Flatness Tolerance: Sign shall remain flat or uniformly curved under installed conditions as indicated on Drawings and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.2 PANEL-SIGN MATERIALS

- A. Plastic-Laminate Sheet: SP125 decorative thermosetting high-pressure laminate.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
 - 1. Exposed Metal-Fastener Components, General:
 - a. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant slots.

2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- 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 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: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.
- C. Mounting Methods:
 - 1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.

- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23

SECTION 10 21 13 – PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Solid plastic-polymer toilet compartments configured as follows:
 - a. Toilet enclosures.
 - b. Urinal screens.

B. Related Sections:

- 1. Division 06 Section "Rough Carpentry" for wood blocking to anchor partition supports.
- 2. Division 10 Section "Toilet Accessories" for toilet tissue dispensers, grab bars, and similar accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: Actual material samples for each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.
- D. 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 units, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Samples of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 WARRANTY

- A. Installer Warranty: Installer agrees to repair or replace components of plastic toilet compartments that have failed, have become loose or do not operate properly within the specified warranty period.

- 1. Warranty Period: Three years from date of substantial completion.

- B. Manufacturer's Warranty: Manufacturer agrees to replace components that have failed in accordance with the manufacturer's published warranty for the Owner to install.

- 1. Warranty Period: Fifteen years from date of shipping.

1.7 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.

- B. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delay.

- 1. Provide locations for wood blocking to be installed per manufacturer's requirements.

PART 2 - PRODUCTS

2.1 SOLID PLASTIC TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. ASI Global Partitions, Inc.
 - 2. Bobrick Washroom Equipment.
 - 3. Bradley Corporation; Mills Partitions.
 - 4. General Partitions Mfg. Corp,
 - 5. Scranton Products.

- B. Toilet-Enclosure Style: Floor anchored.
- C. Urinal-Screen Style: Floor anchored.
- D. Door, Panel, Screen, 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. Integral Hinges: Configure doors and pilasters to receive integral 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. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- G. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum.

2.2 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, 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. Provide gravity type, spring-action cam type, or concealed torsion rod type to suit manufacturer's standards.
 - 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 and entrance-screen 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 anti-grip profile and in manufacturer's standard finish.

- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, 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.

2.3 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Stainless-Steel Castings: ASTM A 743/A 743M.

2.4 FABRICATION

- A. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- B. 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.
- C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Confirm blocking is installed where required by manufacturer. 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. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters 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.

3.2 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 and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10 21 13

SECTION 10 26 13 – CORNER GUARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Corner guards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

- B. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

- 1. Corner Guards: 12 inches long. Include example top caps.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of corner guard product to include in maintenance manuals.

- 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 84-inch- long units.
 - 2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store corner guards in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 - 2. Keep plastic materials out of direct sunlight.
 - 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store corner-guard covers in a vertical position.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall- and door-protection products from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.3 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
 - 1. Basis of Design: Subject to compliance with requirements, Corner Guards incorporated into the project shall be based on products as follows:
 - a. IPC Door and Wall Protection Systems; Division of InPro Corporation; "Surface-Mount Corner Guard Model 160."
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product and are in compliance with the requirements of this section.
 - a. Construction Specialties, Inc.
 - b. Korogard Wall Protection Systems; a Division of RJF International Corporation.
 - 3. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
 - a. Profile: Nominal 2-inch-long leg and 1/4-inch corner radius.
 - b. Height: 4 feet, above cove base.
 - c. Color and Texture: As selected by Architect from manufacturer's full range.
 - 4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
 - 5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.4 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.5 FABRICATION

- A. Fabricate corner guards according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

2.6 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- 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 and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine walls to which corner guards will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing corner guards.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install corner guards according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

- B. Mounting Heights: Install corner guards in locations and at mounting heights indicated on Drawings.

- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 - 2. Adjust end and top caps as required to ensure tight seams.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

END OF SECTION 10 26 13

SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Underlavatory guards.
- B. Owner-Furnished Material: Toilet paper, hand towel, and soap dispensers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation that are specified for this job.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- 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 products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 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.

1.8 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 TOILET ROOM ACCESSORIES

- A. Basis-of-Design: Subject to compliance with requirements, Toilet Room Accessories incorporated into the project shall be based on products as follows:
 - 1. Bradley Corporation.

- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Brey Krause Manufacturing Company, Inc.

- C. Accessories: As indicated on the Drawings.

2.3 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Plumberex Specialty Products, Inc.
 - 2. Truebro by IPS Corporation.

2.4 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. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.

- D. Frame Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:
 - 1. Provide galvanized-steel backing sheet, not less than 0.034 inch and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

- E. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theft-proof installation, as follows:
 - 1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories and Owner-supplied 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 recommendations.

END OF SECTION 10 28 00

SECTION 12 32 16 - PLASTIC-LAMINATE-FACED CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes plastic-laminate-faced cabinets and accessories of stock design and modified as indicated.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood blocking for anchoring casework.
 - 2. Division 06 Section "Finish Carpentry" for plastic-laminate-clad countertops" for "simulated stone countertops".
 - 3. Division 09 Section "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring casework.
 - 4. Division 09 Section "Resilient Base and Accessories" for resilient base applied to plastic-laminate-faced casework.
 - 5. Division 22 Sections for sinks installed in plastic laminate-faced casework.

1.3 DEFINITIONS

- A. Definitions in the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" apply to the work of this Section.

1.4 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including field joints and filler panels. Indicate manufacturer's catalog numbers for casework.

- C. Samples for Initial Selection: For cabinet finishes.
- D. Samples for Verification: 8-by-10-inch Samples for each type of finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Quality Standard: AWI Certified manufacturer.
- C. Sample Warranty: For special warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Field Conditions" Article.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating or adequate temporary controls are in place to maintain temperature and relative humidity at occupancy levels during the remainder of the construction period. Maintain temperature and relative humidity during the remainder of the construction period in range recommended for Project location by the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Delamination of components or other failures of glue bond.
- b. Warping of components.
- c. Failure of operating hardware.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Subject to compliance with requirements, Plastic-Laminate-Faced Casework incorporated into the project based on products as manufactured as follows:
 - 1. Stevens Industries, Inc.; "1200 Series" and items scheduled on the Drawings.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - 1. Case Systems.
 - 2. TMI Systems Design Corporation.
 - 3. Advanced Cabinet Systems.
 - 4. Millwork Company who complies with quality and manufacturing requirements of this Section and of Division 06 Section "Finish Carpentry."
- C. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.
 - 1. Grade: Premium.
- B. Product Designations: Drawings indicate sizes, configurations, and finish materials of manufactured plastic-laminate-faced cabinets by referencing basis of design manufacturer's catalog numbers. Alternate bid manufacturers' casework shall be of equal or approximate sizes, door and drawer configurations, same finish materials, and comply with the Specifications.

2.3 CASEWORK

- A. Design:
 - 1. Flush overlay.

B. Grain Direction for Wood Grain Plastic Laminate:

1. Vertical on doors, horizontal on drawer fronts.
2. Lengthwise on face frame members.
3. Vertical on end panels.
4. Side to side on bottoms and tops of units.
5. Vertical on knee-space panels.
6. Horizontal on aprons.

C. Exposed Materials:

1. Plastic Laminate: Grade HGS.
 - a. Colors and Patterns: As selected by Architect from manufacturer's full range.
2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.

D. Semiexposed Materials:

1. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
 - a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
2. Hardboard: Use only for cabinet backs where exterior side of back is not exposed.
3. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.

E. Concealed Materials:

1. Solid Wood: Any hardwood or softwood species, with no defects affecting strength or utility.
2. Plywood: Hardwood plywood.
3. Plastic Laminate: Grade BKL.
4. Particleboard.
5. MDF.

2.4 MATERIALS

- A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
- B. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated.
- C. Softwood Plywood: DOC PS 1.
- D. Particleboard: ANSI A208.1, Grade M-2.

- E. MDF: ANSI A208.2, Grade 130.
- F. Hardboard: ANSI A135.4, Class 1 Tempered.
- G. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
- H. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.
- I. Glass for Glazed Doors: Clear laminated tempered glass complying with ASTM C 1172, Kind LT, Condition A, Type I, Class I, Quality-Q3; with two plies not less than 3.0 mm thick and with clear, polyvinyl butyral interlayer.

2.5 COLORS AND FINISHES

- A. Plastic-Laminate Colors, Patterns, and Finishes: As selected by Architect from plastic-laminate manufacturer's full range in the following categories:
 - 1. Solid colors.
 - 2. Wood grains.
 - 3. Patterns.
- B. PVC Edgebanding Color: As selected from casework manufacturer's full range.
- C. A maximum of 4 laminates will be selected and a maximum of 2 edgebands will be selected.

2.6 FABRICATION

- A. Construction: Provide plastic-laminate laboratory casework of the following minimum construction unless noted otherwise:
 - 1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch-thick particleboard.
 - 2. Sink Bases: 3/4-inch-thick plywood.
 - 3. Shelves: 3/4-inch-thick particleboard up to 36 inches in length and 1 inch thick particle for shelves 36 inches and longer.
 - 4. Exposed Backs of Cabinets: 1/2-inch-thick particleboard or MDF.
 - 5. Backs of Cabinets: 1/4-inch MDF.
 - 6. Mounting Frames: 3/4-inch-thick particleboard with a minimum of two dowel pins per frame end joint.
 - 7. Boxes (toe kicks): 3/4-inch water-resistant grade plywood.
- B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.7 CASEWORK HARDWARE AND ACCESSORIES

- A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard finish, commercial-quality, heavy-duty hardware.
 - 1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.
 - 2. Color and finish to be selected from manufacturer's full range of colors and finishes.
- B. Butt Hinges: Steel, semiconcealed, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.
- C. Pulls: Solid wire pulls, fastened from back with two screws. For sliding doors, provide recessed stainless-steel or chrome-plated flush pulls. Provide two pulls for drawers more than 24 inches wide.
- D. Door Catches: Nylon-roller spring catch. Provide two catches on doors more than 48 inches high.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch.

- E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
- F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 CLEANING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 12 32 16

SECTION 22 00 10 - BASIC REQUIREMENTS – PLUMBING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for plumbing system installations. Administrative and procedural requirements are included in this Section and in various Division 1 Sections.

1.3 PERMITS AND FEES

- A. Refer to Non-Technical Specifications, General Conditions for information relating to permits and fees.

1.4 PROJECT SCHEDULE

- A. Refer applicable Non-technical specification sections for contract completion time and project construction schedule.

1.5 SHOP DRAWINGS AND SUBMITTALS

- A. Follow the procedures specified in the Division 01 sections. Also refer to individual sections of the Division 22 specifications for additional shop drawing and Submittal requirements.
- B. It is the responsibility of the contractor to thoroughly review any and all shop drawings prior to submission to the Architect/Engineer. The contractor's review shall include verifying conformance to the project documents. The contractor will also be responsible for verifying the quantities of materials are adequate.
- C. All shop drawings shall be submitted with a cover sheet indicating the name of the project, the Architects and Engineers name, the name of the vendor and the contractor. There must be sufficient space on the title sheet to allow the appropriate stamping by both the Architect and the Engineer. Shop drawings and submittals not conforming to the above may be returned without review.
- D. All shop drawing submittals will include a listing of any and all exceptions to the requirements indicated in the specifications and on the drawings. Where there are no exceptions, the submittals shall indicate such. Submittals that do not have this listing will not be reviewed.

1.6 COORDINATION DRAWINGS

- A. Coordination drawings are required. Refer to applicable Division 01 sections for the work required by this Contractor in preparing Coordination Drawings.

1.7 INSTALLATION ACCESSIBILITY

- A. The installation of all equipment and appurtenances shall be done so that access and clearances meet the requirements of the equipment manufacturer and all applicable codes.

1.8 ACCEPTABLE MANUFACTURERS

- A. The design of the mechanical systems is based on the equipment manufacturer indicated on the drawings. Although individual sections of the specifications may list other manufacturers, these manufacturers will be accepted only if the following occurs:
 - 1. Performance, as judged by the engineer, must be equal to the design based equipment.
 - 2. Operating characteristics, as judged by the engineer, must be identical to those of the design based equipment.
 - 3. Physical size of the equipment must be such that it can be installed in the available space, maintaining all required clearances for access / maintenance and meet the architectural requirements of the project such as installed height, length, width and operating weight. The contractor shall be responsible for verifying the equipment meets this requirement.
 - 4. The contractor will be responsible for any costs associated with additional supports, changes in electrical wiring, or piping changes that may be required if equipment other than the design based is used.

1.9 RECORD DOCUMENTS

- A. Prepare record documents in accordance with applicable Division 01 sections.

1.10 OPERATING AND MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with applicable Division 01 sections.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. When materials and products are stored on site, provide protection from weather and temperatures that may cause damage to the items.

1.12 EXTRA MATERIALS

- A. Various specification sections may indicate extra materials that are to be provided with the respective equipment. Where indicated the contractor shall provide the required extra materials.

1.13 WARRANTY

- A. All equipment, material and labor provided by the contractor shall be warranted for a minimum period of one year after the date of substantial completion.

PART 2 - PRODUCTS

- 2.1 Not Applicable.

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Obtain equipment shop drawings for the various items that require rough-in.

3.2 MECHANICAL INSTALLATIONS

- A. Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate mechanical systems, equipment, and materials installation with other building components.
 - 2. Verify all dimensions by field measurements.
 - 3. Coordinate requirements for chases slots, and openings in other building components during the progress of construction, to allow for mechanical installations.
 - 4. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 5. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 6. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
 - 8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
 - 9. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
 - 10. Install systems, materials, and equipment giving right-of-way priority to the systems required to be installed at a specified slope.
 - 11. Seal all places where piping or ducts pass through walls and floors.

3.3 CUTTING AND PATCHING

- A. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 - 1. Uncover Work to provide for installation of ill-timed Work.
 - 2. Removal and replacement of defective Work.
 - 3. Remove and replace Work not conforming to requirements of the Contract Documents.
 - 4. Remove samples of installed Work as specified for testing.
 - 5. Install equipment and materials in existing structures.

- B. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

- C. In areas of the building where new finishes are being provided, the patching required on a surface which is to receive a new finish will be to bring the underlying surface up to the finish required to receive the final finish. This contractor shall coordinate subsurface finish requirements with the finish trade contractor(s).

- D. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

- E. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.4 CLEANING

- A. This contractor shall be required to thoroughly clean all installed equipment, duct work and piping. Cleaning shall be required before substantial completion on any phase of the project. Do not use cleaning materials and agents that are hazardous to health or property or that may damage the finished surfaces.

END OF SECTION 22 00 10

SECTION 22 05 00 - COMMON WORK REQUIREMENTS - PLUMBING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes materials and methods that are common to various Plumbing Systems.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, 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.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Escutcheons.
 - 2. Access Doors.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code—Steel".

- B. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. 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.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for all system items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Epco Sales, Inc.
 - c. Hart Industries, International, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
 - e. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 minimum working pressure as required to suit system pressures.
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Epco Sales, Inc.
 - c. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Pipeline Seal and Insulator, Inc.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150 psi minimum working pressure where required to suit system pressures.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
 - 1. Manufacturers:
 - a. Perfection Corp.

- b. Precision Plumbing Products, Inc.
- c. Sioux Chief Manufacturing Co., Inc.

2.4 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

2.5 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With set screw.
- C. Finish: Polished chrome-plated and Rough brass.

2.6 ACCESS DOORS

- A. Manufacturers: Subject to review, provide access doors manufactured by Milcor, Inc or equal.
- B. Description: Steel access doors and frames for installation in masonry and/or drywall/gypsum board assemblies. Provide fire rated access doors when doors are installed in a fire rated assembly.
- C. Frames: minimum 16 gage steel with exposed nominal 1" flange around the perimeter of the unit. Where doors are to be installed in drywall/gypsum board assemblies provide frames with a drywall bead. Doors to be installed in masonry shall be furnished with adjustable metal masonry anchors.
- D. Flush Panel Doors: minimum 14 gage steel with concealed spring or piano hinge(s) with a minimum swing of 175 degrees. Finish to be a factory-applied primer, suitable for field painting. Provide flush cylinder lock with key. Key all locks alike.
- E. Access door schedule: In addition to access door shown on the drawings provide the following access doors to be installed where directed by the architect or engineer:
 - 1. Two 16" x 16" to be installed in drywall/ gypsum construction.
 - 2. Two 16" x 16" to be installed in masonry construction.

2.7 FIRESTOPPING

- A. The contractor shall be responsible for providing permanent, UL approved firestopping systems for all penetrations through fire rated floor or fire rated wall assemblies. All firestopping shall meet the requirements of ASTM E-814 and UL 1479.

- B. Subject to compliance with project requirements, firestopping materials may be provided by one of the following manufacturers:
 - 1. Specified Technologies Inc. (STI) Somerville, NJ.
 - 2. Tremco, Beechwood, OH.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise. Maintain unobstructed passageway of not less than 42" in width and 80" minimum head clearance as required by code.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Install piping to permit valve servicing. Install piping at indicated slopes. Install piping free of sags and bends.
- F. Install fittings for changes in direction and branch connections.
- G. Install piping to allow application of insulation.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install escutcheons for penetrations of walls, ceilings, and floors.
- J. Sleeves are not required for core-drilled holes.
- K. Permanent sleeves are not required for holes formed by removable sleeves.
- L. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. **Steel Pipe Sleeves:** For pipes smaller than NPS 6 (DN 150).
 - b. **Steel Sheet Sleeves:** For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.
 - c. **Stack Sleeve Fittings:** For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.
- M. Seal annular space between sleeve or opening and pipe or pipe insulation, using sealants appropriate for size, depth, and location of joint.
- N. Aboveground and Underground, Exterior-Wall Pipe Penetrations: Provide Mechanical Sleeve Seal and wall sleeve.
1. **Mechanical Sleeve Seal Installation:** Select type and number of sealing elements required for pipe material and sized per manufacturer's recommendations. Position the pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. **Corrosion Protection:** Pipes passing through concrete walls and/or floors and through block walls shall be protected against external corrosion by a protective sheathing or wrapping that will withstand any reaction from wall or floor material.
- P. **Fire-Barrier Penetrations:** Maintain indicated fire rating of walls, partitions, ceilings, and floors at all pipe penetrations. Where required seal all pipe penetrations with fire stop materials.
- Q. **Roof penetrations:** provide roof curbs with pipe portals at all locations where gas piping penetrates the roof.
- R. Verify final equipment locations for roughing-in.
- S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- 3.2 PIPING JOINT CONSTRUCTION
- A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
 - B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. 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 unless dry seal threading is specified.
 - 2. 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.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- B. Install equipment to maintain unobstructed passageway of not less than 42" in width and 80" minimum head clearance as required by code.
- C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.5 ACCESS DOORS

- A. Comply with manufacturer's written instructions for installing access doors and frames. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces. Install doors flush with adjacent finish surfaces or recessed to receive finish material.
- B. Adjust doors and hardware after installation for proper operation. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 22 05 00

SECTION 22 05 40 – GENERAL DUTY VALVES FOR PLUMBING 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. Ball valves.
 - 2. Butterfly valves.
 - 3. Check valves.

1.3 SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.
- D. The installation and materials shall comply with the requirements of the 2015 International Plumbing Code and any applicable local code amendments. Verify code with requirements with the local code officials.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- B. Valve Sizes: Same as upstream piping unless otherwise indicated.
- C. Valves in Insulated Piping: With stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
2. Butterfly Valves: With extended neck.

D. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.

E. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRASS BALL VALVES

A. Two-piece full-port, Brass Ball Valves with Brass Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Stockham.
2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig (1035 kPa).
 - c. CWP Rating: 600 psig (4140 kPa).
 - d. Body Design: Two piece.
 - e. Body Material: Forged brass.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Brass.
 - i. Ball: Chrome-plated brass.

2.3 BRONZE BALL VALVES

A. Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.; Apollo Valves.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

- 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig (1035 kPa).
 - c. CWP Rating: 600 psig (4140 kPa).
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Bronze.
 - i. Ball: Chrome-plated brass.

2.4 BRONZE SWING CHECK VALVES

- A. Class 125, Bronze Swing Check Valves with Bronze Disc:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Co.; Crane Valve Group
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 200 psig (1380 kPa).
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: Bronze.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow.

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball or butterfly valves.
 - 2. NPS 2-1/2 (DN 65) and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring or iron, center-guided check valves.

END OF SECTION 22 05 40

SECTION 22 05 50 - 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. This Section includes hangers and supports for plumbing system piping and equipment.

1.3 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

PART 2 - PRODUCTS

2.1 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- C. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- D. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.3 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

- 1. Manufacturers:

- a. Hilti, Inc.
 - b. ITW Ramset/Red Head.
 - c. Masterset Fastening Systems, Inc.
 - d. MKT Fastening, LLC.
 - e. Powers Fasteners.
- B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- 1. Manufacturers:
 - a. B-Line Systems, Inc.; a division of Cooper Industries.
 - b. Empire Industries, Inc.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head.
 - e. MKT Fastening, LLC.
 - f. Powers Fasteners.

2.4 PIPE STAND FABRICATION

- A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

2.5 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified 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 padded hangers for piping that is subject to scratching.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).

2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F (49 to 232 deg C) pipes, NPS 4 to NPS 16 (DN 100 to DN 400), requiring up to 4 inches (100 mm) of insulation.
 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24 (DN 20 to DN 600), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24 (DN 15 to DN 600), if little or no insulation is required.
 5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8 (DN 20 to DN 200).
 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 (DN 15 to DN 200).
 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 (DN 15 to DN 200).
 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2 (DN 15 to DN 50).
 10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8 (DN 10 to DN 200).
 11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3 (DN 10 to DN 80).
 12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
 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 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange.
 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange 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 (DN 65 to DN 900), 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 (DN 25 to DN 750), from 2 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 20 (DN 65 to DN 500), 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 (DN 50 to DN 1050), 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 (DN 50 to DN 600), 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 (DN 50 to DN 750), if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- G. 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 20 (DN 20 to DN 500).

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.
- H. 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 (150 mm) for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) 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 (49 to 232 deg C) piping installations.
- I. 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 (340 kg).
 - b. Medium (MSS Type 32): 1500 lb (680 kg).
 - c. Heavy (MSS Type 33): 3000 lb (1360 kg).
 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.
- J. 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.
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb 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 absorb 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 absorb 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.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- N. Use [powder-actuated fasteners] [or] [mechanical-expansion anchors] instead of building attachments where required in concrete construction.
- O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel 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 building structure.
- B. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

- D. Fastener System Installation:
1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- F. 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.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. 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 (DN 65)] <Insert other> 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.
- I. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
- K. Insulated Piping: Comply with the following:
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 according to 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 (DN 100) 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 (DN 100) 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 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.4 PAINTING

- A. Touch Up: 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 (0.05 mm).
- B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 [painting Sections.] [Section "High-Performance Coatings."]
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 22 05 50

SECTION 22 07 00 - PLUMBING SYSTEM 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. This section includes insulation materials and accessories for insulating Plumbing piping and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity and jackets (both factory- and field-applied, if any).

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting 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 and inspecting agency.

1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields. Coordinate clearance requirements with piping Installer for insulation application.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Mineral-Fiber Plumbing Pipe Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Products: Subject to compliance with requirements, provide Johns Manville Micro-Loc insulation or equal products manufactured by one of the following:
 - a. Knauf Insulation.
 - b. Owens Corning Fiberglas Insulation.
 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-SSL.
 3. Provide High-impact-resistant, UV-resistant PVC jacketed fitting covers complying with ASTM D 1784, Class 16354-C; Flame spread 25 or less; Smoke development 50 or less.
- B. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. (40 kg/cu. m) or more. Thermal conductivity (k-value) at 100 deg F (55 deg C) is 0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K) or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; CrimpWrap.
 - b. Johns Manville; MicroFlex.
 - c. Knauf Insulation; Pipe and Tank Insulation.
 - d. Manson Insulation Inc.; AK Flex.
 - e. Owens Corning; Fiberglas Pipe and Tank Insulation.
- C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Products: Subject to compliance with requirements, provide products manufactured by one of the following:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

2.2 CEMENTS, ADHESIVES AND MASTICS

- A. Provide all required types of cements, adhesives, mastics and other accessories required to install all insulation materials and systems per the Manufacturer's Installation Requirements. Prepare surfaces as required by the insulation manufacturers. Install cements, adhesives and mastics per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.
- E. Apply 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. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- H. Keep insulation materials dry during application and finishing.
- I. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- J. Apply insulation with the least number of joints practical.
- K. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.
- L. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.
 - 1. Apply insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor retarders are indicated, extend insulation on anchor legs at least 12 inches (300 mm) from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
 - 3. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- M. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- N. Apply adhesives and mastics at the manufacturer's recommended coverage rate.
- O. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Circumferential Joints: Cover with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches (100 mm) o.c.

3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.

P. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

Q. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.

1. Firestopping and fire-resistive joint sealers are specified in other Division 22 Sections.

R. Floor Penetrations: Apply insulation continuously through floor assembly.

1. For insulation with vapor retarders, seal insulation with vapor-retarder mastic where floor supports penetrate vapor retarder.

3.2 MINERAL-FIBER INSULATION APPLICATION

A. Insulation Installation on Straight Pipes and Tubes per manufacturer's instructions. Where vapor barriers are required, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but 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 Fittings, Elbows, 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.

3.3 FLEXIBLE ELASTOMERIC INSULATION APPLICATION

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. Apply Insulation on Pipe Fittings, Elbows, Valves and Pipe Specialties.

3.4 INSULATION APPLICATION SCHEDULE, GENERAL

- A. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

3.5 INTERIOR INSULATION APPLICATION SCHEDULE

- A. Service: Domestic hot and re-circulated hot water.
 - 1. Operating Temperature: 60 to 140 deg F.
 - 2. Insulation Material: 1 ½" Mineral fiber.

- B. Service: Domestic cold water.
 - 1. Operating Temperature: 35 to 60 deg F.
 - 2. Insulation Material: 1" thick Mineral fiber with vapor barrier.

END OF SECTION 22 07 00

SECTION 22 11 10 - 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. This section includes domestic water piping for underground, under slab and above ground installations including accessories.

1.3 SUBMITTALS

- A. Product Data: For the following products:
 - 1. Specialty valves.
 - 2. Piping materials.

1.4 QUALITY ASSURANCE

- A. The installation shall comply with the requirements of the 2015 International Plumbing Code (I.P.C.) and any applicable local code amendments. Verify the code with requirements with the local code official(s) before beginning the work.
- B. All domestic water piping and fittings are required to bear the identification of the manufacturer as required in Chapter 3; paragraph 303.1 of the IPC.
- C. Comply with NSF 61 for potable domestic water piping and components.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt service to any portion of the existing occupied facilities until receiving permission. If interruption of the existing service is required, coordinate the work with the Owner and, if necessary, perform the work at a time, other than normal working hours, which is suitable to the owner.

1.6 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

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.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.
1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- C. Grooved Joint Copper Piping Systems: Provide grooved copper products manufactured by Victaulic. All grooved copper system components are to be supplied by the same manufacturer.
1. Copper Tube: ASTM B 88, Type L roll grooved in accordance with the manufacturer's standards and copper tube dimensions.
 2. Couplings for grooved piping to consist of ductile iron cast housings with synthetic rubber gasket of a pressure responsive design with plated nuts and bolts to secure the unit. Couplings shall be manufactured to connect to copper tubing and fittings without flaring.
 - a. Coupling housings: ductile iron (ASTM A-536, grade 65-45-12) coated with copper colored alkyd enamel.
 - b. Coupling Gaskets: gasket to be Grade EHP EPDM compound with red color code design for operating temperatures from minus 30 degrees F to plus 250 degrees F.
 - c. Victaulic Style 607 installation ready coupling for direct stab installation with filed disassembly.
 3. Fittings: manufactured to copper tube sizes with grooves designed to accept grooved couplings. Fittings shall be wrought copper conforming to ASTM B-75 alloy C12200 or ASTM B-152 alloy C11000 and ANSI B16.22.
- D. Press-Fit Joint Copper Piping Systems: Provide Press-fit copper pipe products manufactured by Viega, Elkhart Products or NIBCO, Inc
1. Hard Copper Tube: ASTM B88.
 2. Copper fittings: ASME B16.18, ASME B16.22 or ASME B16.26.
 3. Press Fitting: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have SC (Smart Connect™) feature design (leakage path). In ProPress ½" to 4" dimensions the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

2.3 PIPING JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

PART 3 - EXECUTION

3.1 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 shutoff valve immediately upstream of each dielectric fitting.
- C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas. Install exposed piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- D. Install piping adjacent to equipment and specialties to allow service and maintenance. Install piping to permit valve servicing.
- E. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- B. 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.
- C. Soldered Joints: 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."

- D. Joint Construction for Grooved-End Copper Tubing: Make joints according to the manufacturer's instructions and AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.
- E. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION

- A. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 3 and smaller. Use butterfly valves for piping NPS 3 and larger.
- B. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
 - 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
 - 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
- C. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow.

3.4 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.5 PIPE HANGER AND SUPPORT INSTALLATION

- A. Support all domestic water piping in accordance with the 2015 International Plumbing Code or local code requirements.
- B. Hangers shall be of materials that will not support galvanic action. Support piping with adjustable clevis hangers for all horizontal piping. Provide a 12" long 18 gage protective saddle for all clevis hangers that support insulated piping. Support each system independently of other piping systems, allowing for expansion of the pipe.
- C. Install hangers for copper tubing with the following spacing:
 - 1. NPS 1-1/4" and smaller: 6 feet maximum horizontal.
 - 2. NPS 1-1/2" and larger: 10 feet maximum horizontal.
 - 3. Install supports for vertical pipe at a maximum spacing of 10 feet.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to equipment and machines to allow service and maintenance.

- B. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- C. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.

3.7 ESCUTCHEON INSTALLATION

- A. Install escutcheons for penetrations of walls, ceilings, and floors.

3.8 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls. Sleeves are not required for core-drilled holes.
- B. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated. Install sleeves in new partitions, slabs, and walls as they are built.
- C. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Provide fireproofing where required.
- D. Install sleeve materials according to the following applications:
 - 1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
 - 2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe. Extend sleeves 2 inches above finished floor level.
 - 3. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - a. Galvanized-steel sheet sleeves for pipes NPS 6 (DN 150) and larger. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations.

3.9 FIELD QUALITY CONTROL

- A. Test systems according to procedures of authorities having jurisdiction or, in absence of such procedures, testing shall be per the requirements on the International Plumbing Code Section 312, Test and Inspections.
- B. Piping Inspections: coordinate all inspection requirements with the Authorities Having Jurisdiction. Do not enclose, cover, or put piping into operation until it has been inspected and approved.
- C. Domestic water piping will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.10 ADJUSTING

- A. Perform the following adjustments before operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.

3.11 DISINFECTION OF POTABLE WATER SYSTEM(S)

- A. All domestic water piping shall be purged and disinfected prior to utilization. The method to be followed shall be that required by the 2015 International Plumbing Code, Section 610, or the requirements of the local authorities.
- B. Prepare and submit reports of purging and disinfecting activities.

3.12 PIPING SCHEDULE

- A. Aboveground domestic water piping, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L (ASTM B 88M, Type B) copper solder-joint fittings; and soldered, press-fit or grooved joints.

3.13 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 valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 2. Throttling Duty: Use ball valves for piping NPS 2 (DN 50) and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
 - 4. Drain Duty: Hose-end drain valves.

END OF SECTION 22 11 10

SECTION 22 13 10 - 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. This Section includes soil, waste, and vent piping inside the building.

1.3 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. The installation shall comply with the requirements of the 2015 International Plumbing Code (I.P.C.) and any applicable local code amendments. Verify the code with requirements with the local code officials before beginning the work.
- C. All sanitary piping and fittings are required to bear the identification of the manufacturer as required in Chapter 3; 303.1 of the IPC.
- D. Cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and shall be Third Party Tested per the requirements of the I.P.C.

1.5 FIELD CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Engineer and District Representative no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Engineer's or District Representative's permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Identification: Each length of pipe and each pie fitting, trap, fixture material and device utilized in a plumbing system shall bear the identification of the manufacturer.
- B. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Hub and Spigot Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A 74. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute® and listed by NSF® International. Pipe and fittings to be Service (SV) class.
- B. Joints can be made using a compression gasket manufactured from an elastomer meeting the requirements of ASTM C 564 or lead and oakum.
- C. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with manufacturer's recommendations and applicable code requirements.

2.3 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Hubless Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A 888 and CISPI Standard 301. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute® and listed by NSF® International.
- B. Hubless Couplings shall conform to ASTM C 1540 for heavy duty couplings. Gaskets shall conform to ASTM C 564.
- C. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with manufacturer's recommendations and applicable code requirements. Couplings shall be installed in accordance with the manufacturer's band tightening sequence and torque recommendations. Tighten bands with a properly calibrated torque limiting device.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless cast-iron soil pipe and fittings heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
- B. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.

2. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel rigid, couplings; and hubless-coupling joints.

3.2 PIPING INSTALLATION

- A. Install cast-iron sleeve with water stop and Mechanical Sleeve Seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight.
- B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- C. 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."
- D. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. 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. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- E. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 1. Building Sanitary Drain: 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 Drainage Piping: 2 percent downward in direction of flow.
- F. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- G. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

3.4 VALVE INSTALLATION

- A. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
 1. Install full-port ball valve for piping NPS 2 (DN 50) and smaller.
 2. Install butterfly valve for piping NPS 2-1/2 (DN 65) and larger.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with the following requirements:
 - 1. Vertical Piping: MSS SP-69, Type 8 clamps.
 - 2. Horizontal Piping Runs: MSS SP-69, Type 1, adjustable, clevis hangers.
- B. Install hangers for cast-iron soil piping with the following maximum horizontal spacing:
 - 1. All sizes: 60 inches.
 - 2. Spacing for 10-foot lengths, without fittings, may be increased to 10 feet.
- C. Install supports for vertical cast-iron soil piping every 15 feet and at all floors.
- D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 72 inches.
 - 2. NPS 1-1/2 and larger: 120 inches.
- E. Install supports for vertical copper tubing every 10 feet and at all floors.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage 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 drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.

3.7 FIELD QUALITY CONTROL

- A. Test systems according to procedures of authorities having jurisdiction or, in absence of such procedures, testing shall be per the requirements on the International Plumbing Code Section 312, Test and Inspections.
- B. Piping Inspections: coordinate all inspection requirements with the Authorities Having Jurisdiction. Do not enclose, cover, or put piping into operation until it has been inspected and approved.
- C. 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.

3.8 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 13 10

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following conventional plumbing fixtures and related components.

1.3 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 WARRANTY

- A. All equipment, material and labor provided under this specification section shall be warranted for a period of one year after project completion.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below 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.
3. Flushometer Valve, Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than 12 of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Water Closets - subject to compliance with requirements, provide products by one of the following:
 1. Sloan Valve Company.
 2. Zurn Plumbing Products Group
 3. American Standard
 4. Kohler Co.
- B. Urinals - subject to compliance with requirements, provide products by one of the following:
 1. Sloan Valve Company.
 2. Zurn Plumbing Products Group.
 3. American Standard
 4. Kohler Co.
- C. Lavatories: Subject to compliance with requirements, provide products by one of the following:
 1. Sloan Valve Company.
 2. Zurn Plumbing Products Group.
 3. Kohler Co.
 4. American Standard
- D. Flushometers: Subject to compliance with requirements, provide products by one of the following:
 1. DELTA Commercial
- E. Toilet seats: Subject to compliance with requirements, provide products by one of the following:
 1. Bemis Manufacturing Company.
 2. Church Seats.
 3. Eljer.
 4. Kohler Co.
 5. Olsonite Corp.
- F. Fixture Supports: Subject to compliance with requirements, provide products by one of the following:
 1. Josam Company
 2. Smith, Jay R. Mfg. Co.
 3. Tyler Pipe; Wade Div.
 4. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
 5. Zurn Plumbing Products Group; Specification Drainage Operation.

- G. Faucets: Subject to compliance with requirements, provide products by one of the following:
 - 1. DELTA Commercial

- H. Protective Shielding Pipe Covers: Subject to compliance with requirements, provide products by one of the following:
 - 1. TRUEBRO, Inc.
 - 2. McGuire Manufacturing Co., Inc.
 - 3. Plumberex Specialty Products Inc.

2.2 FIXTURES

- A. F1 - Water Closet:
 - 1. Kohler Kingston, elongated vitreous china bowl, 1.28 gallon per flush, siphon jet, wall mounted. Color shall be white.
 - 2. Seat: White open front solid plastic.
 - 3. Flush Valve (Base Bid): Sloan G2 8111, 1.28 gpf: sensor operated - Battery.
 - 4. Flush Valve (Alternate Bid P-1): Sloan Royal 111 ESSs, 1.28 gpf: sensor operated – Hard Wired.
 - 5. Hanger: J. R. Smith.

- B. F2 - Water Closet - (ADA):
 - 1. Same as F1, but mounted at ADA height.

- C. F3 - Urinal - (ADA):
 - 1. Dexter model K5016-ETSS, vitreous china urinal, 0.125 gallon per flush, wall mounted. Color shall be white.
 - 2. Flush Valve (Base Bid): Sloan Optima ECOS, .125 gpf: sensor operated - Battery.
 - 3. Flush Valve (Alternate Bid P-1): Optima ESS, .125 gpf: sensor operated – Hard
 - 4. Hanger: J. R. Smith.

- D. F4 – Lavatory (ADA):
 - 1. Kohler – Kathryn model K-2330 rectangular Undermount bathroom sink, vitreous china with overflow. AFDA compliant.
 - 2. Faucet (Base Bid): DELTA Commercial 59LF-HGMHDF commercial chrome ADA battery operated electronic faucet (provide bateries), 4” center-set, with escutcheon plate, 0.5 gpm max laminar flow discharge @ .25 or .20 gpc, ASSE 1070 mixing valve and integral checks.
 - 3. Faucet (Alternate bid P-1). Same as base bid but provide 120 VAC to 24 VAC transformer and DELTA converter 060683A and 24” extension cable.
 - 4. Drain: chrome grid drain; chrome tailpiece and P-trap.
 - 5. Supplies: chrome angle supplies with loose key stops.
 - 6. Lav Guard: Truebro Lav Shield.

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 plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
- C. Use carrier supports with waste fitting and seal for back-outlet fixtures.
- D. Use carrier supports without waste fitting for fixtures with tubular waste piping.
- E. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- F. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- G. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- H. Install wall-mounting fixtures with tubular waste piping attached to supports.
- I. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.
- J. Install counter-mounting fixtures in and attached to casework.
- K. Install fixtures level and plumb according to roughing-in drawings.
- L. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball if supply stops are not specified with fixture. Valves are specified in Division 15 Section "Valves."
- M. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- N. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

- O. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- P. Install toilet seats on water closets.
- Q. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- R. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.
 - 1. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.4 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- E. Install fresh batteries in sensor-operated mechanisms.

3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- C. Replace washers and seals of leaking and dripping faucets and stops.

3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts. Remove sediment and debris from drains. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 40 00

SECTION 23 00 10 - BASIC REQUIREMENTS – HVAC CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for HVAC installations. Administrative and procedural requirements are included in this Section and in other Non-technical/Division 01 Specification Sections.

1.3 PERMITS AND FEES

- A. Refer to Non-technical/Division 01 Specification Sections, General Conditions of The Contract, for information relating to permits and fees. The Contractor is responsible to submitting for City of Reading Permit. All costs related to the permit shall be paid for by the contractor.

1.4 PROJECT SCHEDULE

- A. **Lead Contractor in charge of Meetings and Scheduling: The General contractor shall be in charge of setting up meetings, running the meetings and creating and following thru with the project schedule.**

1.5 SHOP DRAWINGS AND SUBMITTALS

- A. Follow the procedures specified in the Non-technical/Division 01 Specification Sections. Also refer to individual sections of the Division 23 specifications for additional shop drawing and submittal requirements.
- B. It is the responsibility of the contractor to thoroughly review any and all shop drawings prior to submission to the Architect/Engineer. The contractor's review shall include verifying conformance to the project documents. The contractor will also be responsible for verifying the quantities of materials are adequate.
- C. All shop drawings shall be submitted with a cover sheet indicating the name of the project, the Architects and Engineers name, the name of the vendor and the contractor. There must be sufficient space on the title sheet to allow the appropriate stamping by both the Architect and the Engineer. Shop drawings and submittals not conforming to the above may be returned without review.
- D. All shop drawing submittals will include a listing of any and all exceptions to the requirements indicated in the specifications and on the drawings. Where there are no exceptions, the submittals shall indicate such. Submittals that do not have this listing will not be reviewed.

1.6 COORDINATION DRAWINGS

- A. Coordination drawings are required. Refer to Non-technical/Division 01 Specification Sections for the work required by this Contractor in preparing Coordination Drawings.

1.7 INSTALLATION ACCESSIBILITY

- A. The installation of all equipment and appurtenances shall be completed so that access and clearances meet the requirements of the equipment manufacturer as well as the requirements of all applicable codes.

1.8 ACCEPTABLE MANUFACTURERS

- A. The design of the mechanical systems is based on the equipment manufacturer indicated on the drawings. Although individual sections of the specifications may list other manufacturers, these manufacturers will be accepted only if the following occurs:
 - 1. Performance, as judged by the engineer, must be equal to the design based equipment.
 - 2. Operating characteristics, as judged by the engineer, must be identical to those of the design based equipment.
 - 3. Physical size of the equipment must be such that it can be installed in the available space, maintaining all required clearances for access/maintenance and meet the architectural requirements of the project such as installed height, length, width and operating weight. The contractor shall be responsible for verifying the equipment meets this requirement.
 - 4. The contractor will be responsible for any costs associated for adding additional supports, changes in electrical wiring, piping changes, ductwork changes and / or controls that may be required if equipment other than the design based is used.

1.9 RECORD DOCUMENTS

- A. Prepare record documents, including Operating and Maintenance Manuals, in accordance with Non-technical/Division 01 Specification Sections. In addition to the requirements specified, indicate the following installed conditions:
 - 1. Mains and branches of piping systems, with valves and control devices and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
 - 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - 3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
 - 4. Contract Modifications, actual equipment and materials installed.
 - 5. Record Documents are to be prepared and/or revised to indicate the room names and numbers to be used by the owner after the projects is complete.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

- B. When materials and products are stored on site, provide protection from weather and temperatures that may cause damage to the items.

1.11 EXTRA MATERIALS

- A. Various Division 23 Specification Sections may indicate extra materials (filters, fan belts etc) that are to be provided with the respective equipment. Where indicated, the contractor shall provide the required extra materials.
- B. When directed by the owner's representative, the contractor shall install extra filters in the respective equipment. If no additional installation is required, the contractor shall forward, to the owner, all extra materials. When forwarding materials obtain a receipt for any materials forwarded.
- C. The contractor shall also provide a list of all filter sizes for each type and size of unit provided on the project.

PART 2 - PRODUCTS

- 2.1 Not Applicable.

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Obtain equipment shop drawings for the various items that require rough-in.

3.2 HVAC INSTALLATIONS

- A. Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate mechanical systems, equipment, and materials installation with other building components.
 - 2. Verify all dimensions by field measurements.
 - 3. Coordinate requirements for chases slots, and openings in other building components during the progress of construction, to allow for mechanical installations.
 - 4. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 5. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 6. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
9. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
10. Install systems, materials, and equipment giving right-of-way priority to the systems required to be installed at a specified slope.
11. Seal all places where piping or ducts pass through walls and floors.

3.3 CUTTING AND PATCHING

- A. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 1. Uncover Work to provide for installation of ill-timed Work.
 2. Removal and replacement of defective Work.
 3. Remove and replace Work not conforming to requirements of the Contract Documents.
 4. Remove samples of installed Work as specified for testing.
- B. Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- C. In areas of the building where new finishes are being provided, the patching required on a surface which is to receive a new finish will be to bring the underlying surface up to the finish required to receive the final finish. This contractor shall coordinate subsurface finish requirements with the finish trade contractor(s).
- D. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
- E. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.4 CLEANING

- A. This contractor shall be required to thoroughly clean all installed equipment, duct work and piping. Cleaning shall be required before substantial completion on any phase of the project. Do not use cleaning materials and agents that are hazardous to health or property or that may damage the finished surfaces.

END OF SECTION 23 00 10

SECTION 23 05 00 – COMMON WORK REQUIREMENTS – HVAC CONSTRUCTION

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. This Section includes materials and methods that are common to various HVAC s installations.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, 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.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Mechanical sleeve seals.
 - 2. Escutcheons.

- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

- a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
- b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

- 2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.

2.4 MECHANICAL SLEEVE SEALS

- A. Description: Pipe wall penetration seals to be of the modular link type. Seals shall consist of a series of interlocking, molded synthetic rubber links, with heavy-duty plastic pressure plates, and corrosion resistant nuts and bolts. Seals to be designed to provide a hydrostatic seal between the pipe and wall penetration. Seals shall be sized and selected per manufacturer recommendations. Mechanical pipe seals shall be fabricated of an EPDM elastomer for general service and a Nitrile/ Buna-N for hydrocarbon/petroleum based applications. Provide stainless steel hardware as required.
- B. Steel wall sleeve: Cast in place concrete wall sleeves to be fabricated from galvanized heavy wall welded or seamless carbon steel pipe. All sleeves to have a 2" wide, full perimeter water stop, welded on both sides.
- C. Mechanical pipe seals and wall sleeves shall be manufactured by The Metraflex Company®, or Flexicraft Industries.

2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated and rough brass.

2.7 FIRESTOPPING

- A. The contractor shall be responsible for providing permanent, UL approved firestopping systems for all penetrations through fire rated floor or fire rated wall assemblies. All firestopping shall meet the requirements of ASTM E-814 and UL 1479. Firestopping for ducts shall be installed with materials and methods identified in UL Ventilation Duct Assemblies (HNLJ), V Series as applicable to the wall assembly specified.
- B. Subject to compliance with project requirements, firestopping materials may be provided by one of the following manufacturers:
 - 1. Specified Technologies Inc. (STI) Somerville, NJ.
 - 2. Tremco, Beechwood, OH.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Install piping to permit valve servicing. Install piping at indicated slopes. Install piping free of sags and bends.
- F. Install fittings for changes in direction and branch connections.
- G. Install piping and pipe supports to allow application of insulation.
- H. Select system components with pressure rating equal to or greater than system operating pressure.

- I. Install escutcheons for penetrations of walls, ceilings, and floors.
- J. Sleeves are not required for core-drilled holes.
- K. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
 - 2. Install sleeves in all new walls and floor slabs as walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide sufficient annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.
- L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at all pipe and duct penetrations. Where required seal all pipe and duct penetrations with firestop materials.
- M. Verify final equipment locations for roughing-in.
- N. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazeing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

3.3 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment to maintain unobstructed passageway of not less than 42" in width and 80" minimum head clearance as required by code.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment to allow right of way for piping installed at required slope.

END OF SECTION 23 05 00

SECTION 23 06 00 - HVAC SYSTEM TESTING, ADJUSTING, AND BALANCING

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. Testing, Adjusting and Balancing (TAB) work is to be provided a qualified TAB firm and shall be part of the HVAC Contractor's work.
- B. Work under this section includes, but is not limited to, Testing, Adjusting and Balancing (TAB) of the following air systems, water systems and HVAC equipment:
 - 1. All energy recovery units, supply and exhaust sides, (ERU).
 - 2. All ceiling cassette units (EVP)
- C. All TAB work shall comply with the requirements of TAB procedures required by the Associated Air Balancing Council, National Environmental Balancing Bureau and ASHRAE.
- D. Coordinate and witness the installation work of the HVAC Contractor including all sub-contractors working for the HVAC Contractor and Electrical Contractor. Provide progress inspections of the work to ensure the installation of all systems is progressing as required and will operate as specified when completed. Report results of the progress inspection to the Owner's Representative.
- E. Submit balancing reports for all air systems.
- F. Validate the start-up and operation of all HVAC equipment and systems by the HVAC Contractor.
- G. Validate the start-up and operation of the HVAC Controls system. Submit reports indicating the operation of all equipment, throughout the range of operation, meets the requirement of the Sequence of Operations.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.

1.4 SUBMITTALS

- A. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified herein.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by NEBB or AABC in the testing, adjusting and balancing of both air and water systems. The firm shall guarantee that all work will be performed in accordance with the applicable NEBB/AABC standards and procedures, and evidence of the firm's certification shall be provided for the engineer or designated owner's representative.

1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and portions of the existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations. Review the project's construction phasing plan and provide the necessary number of TAB visits to comply with the phasing plan.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- B. Refer to the Contract Drawings for notes that relate to balancing of the air and water systems.
- C. Examine the approved shop drawing submittals for all HVAC systems and equipment prior to starting the TAB work.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section Metal Ducts, and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine operating safety interlocks and controls on HVAC equipment.
- J. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Verify all systems are complete, including controls, before starting the TAB work.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in the applicable NEBB or AABC standards.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors where required.
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish to meet the requirements of the installation.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- C. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- D. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- E. Check dampers for proper position to achieve desired airflow path.
- F. Check for airflow blockages.
- G. Check condensate drains for proper connections and functioning.

- H. Where required, verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."
- I. Install instrument test holes in ducts at all required locations for testing and balancing purposes.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow. Measure air flows in main ducts and at terminal outlets and inlets.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of branch ducts.
 - 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 - 3. Re-measure each branch duct after all have been adjusted. Continue to adjust branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and

the dampers at air terminals. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents. Adjust patterns of adjustable outlets for proper distribution without drafts.

- E. Measure and verify ventilation air flows are as indicated on the equipment schedules.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 - 1. Open all manual valves for maximum flow.
 - 2. Check liquid level in expansion tank.
 - 3. Check makeup water-station pressure gage for adequate pressure for highest vent.
 - 4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
 - 5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
 - 6. Set system controls so automatic valves are wide open to heat exchangers.
 - 7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 - 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.7 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.
- C. ECM Motors: Obtain and review manufacturer's information which indicates methods and procedures to balance air flow.

3.8 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

3.9 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.
 - 3. Field test reports prepared by system and equipment installers.
 - 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following general data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.
 - 3. Project name and location.
 - 4. Architect's and Engineer's name and address.
 - 5. Contractor's name and address.
 - 6. Report date.
 - 7. Signature of TAB supervisor who certifies the report.
 - 8. Table of Contents with the total number of pages defined for each section of the report.
 - 9. Number each page in the report.
 - 10. Summary of contents.
 - 11. Data for terminal units, including manufacturer's name, type, size, and fittings.
 - 12. Notes to explain why certain final data in the body of reports vary from indicated values.
 - 13. Test conditions for fans and pump performance forms.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
 - 1. Quantities of outdoor, supply, return, and exhaust airflows.
 - 2. Water and steam flow rates.
 - 3. Duct, outlet, and inlet sizes.
 - 4. Pipe and valve sizes and locations.
 - 5. Terminal units.
 - 6. Balancing stations.
 - 7. Position of balancing devices.

- E. Energy Recovery Unit Test Reports: For supply, and exhaust fans, include the following:
1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches w.g.
 - c. Fan rpm.
 - d. Discharge static pressure in inches w.g.
 - e. Suction static pressure in inches w.g.
- F. Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg. F.
 - d. Duct static pressure in inches w.g.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- G. Air-Terminal-Device Reports:
1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.

- d. Area served.
- e. Make.
- f. Number from system diagram.
- g. Type and model number.
- h. Size.
- i. Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

- a. Air flow rate in cfm.
- b. Air velocity in fpm.
- c. Preliminary air flow rate as needed in cfm.
- d. Preliminary velocity as needed in fpm.
- e. Final air flow rate in cfm.
- f. Final velocity in fpm.
- g. Space temperature in deg. F.

H. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.10 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing is complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, submit the final report for review.
2. The **Owner may** select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
3. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
4. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

3.11 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 06 00

SECTION 23 07 00 - HVAC SYSTEM 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 insulation materials and accessories for insulating HVAC system piping, ductwork, and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.4 QUALITY ASSURANCE

- A. Duct and pipe insulation, including adhesives, shall have a flame spread index not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723, using the procedures of ASTM E2231. Duct coverings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250 degrees F.
- B. All insulation values are to meet the requirements of the applicable edition of the International Energy Conservation Code.
- C. Insulation installed on the exterior of ducts, located within the building, shall bear identification at intervals not greater than 36" with the name of the manufacturer, the R value at the specified installed thickness and the flame spread and smoke developed indexes of the composite materials.

1.5 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. Store materials providing protection from the elements.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields. Coordinate clearance requirements with the duct and piping.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials. Insulation conductivity (k) shall not exceed 0.27 Btu per inch/h – ft² – deg. F.
 - 1. Products: Subject to compliance with requirements, provide products manufactured by one of the following:
 - a. Armacell LLC; AP Armaflex.
 - b. Aeroflex USA Inc.; Aerocel.

- B. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 1136 with factory-applied FSK jacket. Insulation conductivity (k) shall not exceed 0.27 Btu per inch/h – ft² – deg. F.
 - 1. Products: Subject to compliance with requirements, provide Johns Manville Microlite insulation or equal products manufactured by one of the following:
 - a. CertainTeed Corp.
 - b. Knauf Insulation.
 - c. Owens Corning.

- C. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. For duct and plenum applications, provide insulation with factory-applied FSK jacket.
 - 1. Subject to compliance with requirements, provide Johns Manville 800 Series Spin-Glas insulation or equal products manufactured by one of the following:
 - a. CertainTeed Corp.
 - b. Knauf Insulation.
 - c. Owens Corning.
 - d. Manson Insulation.

- D. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Subject to compliance with requirements, provide Johns Manville Micro-Lok insulation or equal products manufactured by one of the following:
 - a. Knauf Insulation; 1000 Pipe Insulation.
 - b. Owens Corning; Fiberglas Pipe Insulation.
 - 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-SSL.
 - 3. Provide High-impact-resistant, UV-resistant PVC jacketed fitting covers complying with ASTM D 1784, Class 16354-C; Flame spread 25 or less; Smoke development 50 or less.

- E. Mineral-Fiber Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semi-rigid board material with factory-applied FSK jacket.

1. Subject to compliance with requirements, provide Johns Manville Micro-Flex insulation or equal products manufactured by one of the following:
 - a. Knauf Insulation; Pipe and Tank Insulation.
 - b. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 CEMENTS, ADHESIVES, SEALANTS AND MASTICS

- A. Provide all required types of cements, adhesives, sealants, mastics and other accessories required to install all insulation materials and systems. Prepare surfaces as required by the insulation manufacturers. Install cements, adhesives, sealants and mastics per manufacturer's recommendations.

2.3 PVC JACKETING

- A. PVC jacketing, 30 mil thickness with flame spread of 25 or less and a smoke development of 50 or less. Temperature rating 150 degrees F.
 1. Subject to compliance with requirements, provide Johns Manville Zeston Jacketing or equal.

2.4 CORRUGATED ALUMINIUM JACKETING

- A. Corrugated aluminum jacketing, .020 mm thickness. ASTM Standard C1729.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes per the manufacturer's instruction with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and 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 per manufacturer's instructions.
- 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 (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.2 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations. Seal penetrations 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.
- 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. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

F. Insulation Installation at Floor Penetrations:

1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches (50 mm).
2. Pipe: Install insulation continuously through floor penetrations.
3. Seal penetrations through fire-rated assemblies.

3.3 GENERAL PIPE INSULATION INSTALLATION

A. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Union and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated. 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.

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

B. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.4 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with adhesives to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulate all pipe fittings, elbows, valves and pipe specialties.
- C. Apply weather resistant coating on all exterior insulation to protect the insulation from ultraviolet rays. Provide Armaflex WB Finish water based coating or equal.

3.5 MINERAL-FIBER INSULATION INSTALLATION

- A. Insulation Installation on Straight Pipes and Tubes per manufacturer's instructions. Where vapor barriers are required, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but 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 Fittings, Elbows, 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.
- C. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins, apply adhesives according to manufacturer's recommended coverage rates per unit area.
 - 1. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - 2. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 - 3. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- D. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins. Apply adhesives according to manufacturer's recommended coverage rates per unit area.
 - 1. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

2. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 DUCT INSULATION SCHEDULE, GENERAL

- A. Duct systems requiring insulation on the exterior of the ducts:
 1. Indoor, concealed supply, return and outdoor air ducts.
 2. Indoor, exposed supply, return and outdoor ducts located in an unconditioned space.
- B. Items Not Insulated:
 1. Factory-insulated flexible ducts.
 2. Factory-insulated plenums and casings.
 3. Flexible connectors.
 4. Ducts with interior duct liner unless otherwise noted.

3.7 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Supply air ducts and plenums, hydronic coils furnished on VAV air terminal units and hydronic duct coils located above ceilings, shall be insulated with:
 1. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density; uncompressed "R" value 8.0; with vapor barrier having a maximum permeance of 0.05 perm.
- B. Return air ducts and plenums located above ceilings, shall be insulated with:
 1. Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density; uncompressed "R" value 6.0; with vapor barrier having a maximum permeance of 0.05 perm.
- C. Outdoor air ducts and plenums located above ceilings, shall be insulated with:
 1. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density; uncompressed "R" value 8.0; with vapor barrier having a maximum permeance of 0.05 perm.

3.8 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR PIPING INSULATION SCHEDULE

- A. Condensate and Equipment Drain Water Piping:
 1. All Pipe Sizes: Insulation shall be Flexible Elastomeric: 3/4 inch thick.

- B. Make-up Water:
 - 1. All sizes: Insulation shall be Mineral-Fiber, 1 inch thick with vapor barrier.

- C. Refrigerant piping and hot-gas piping:
 - 1. Flexible Elastomeric, 1" inches thick.

- D. Heating-Hot-Water Supply and Return:
 - 1. NPS 1 ½ inches and smaller, insulation shall be:
 - a. Mineral-Fiber: 1½ inches thick.
 - 2. NPS 2 inches and larger, insulation shall be:
 - a. Mineral-Fiber: 2 inches thick.

3.10 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Refrigerant Liquid, Suction and Hot-Gas Piping:
 - 1. All Pipe Sizes: Insulation shall be Flexible Elastomeric, 1 inch thick with PVC jacket.

END OF SECTION 23 07 00

SECTION 23 09 00 - HVAC SYSTEM CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Refer to other HVAC Specification Sections which describe the requirements of the HVAC system components.

1.2 SUMMARY

- A. This Section includes direct digital control (DDC) equipment for control of HVAC systems and various other systems. Refer to all Division 23 specification sections for controls that may be provided with the associated equipment. Provide all required controls and accessories to accomplish the method of control as indicated in Section 230905, Sequence of Operation.
- B. The base bid will be for a Web-Based control system which shall include the VRF controller and control devices described in specification section 238020. The BAS system for the VRF equipment shall be by the equipment manufacture. The VRF control panel shall have communication card to integrate with the building JCI control system. In addition, the base bid will include a second BAS controller and control panel (BACnet/IP) for the boilers, pumps and terminal equipment as described in the sequence on operations.
- C. Alternate Bid M3 - The JCI control system shall fully integrate with the VRF control panel specified with this project as well as the existing Daikin panel for the third floor. The HC will have to include in this alternate replacing the existing communication card in the existing Daikin panel serving the third floor. In addition, JCI will provide a separate DDC control panel, (BACnet/IP), for secondary systems including, but not limited to, unit heaters, cabinet heaters, convectors, pump status, boiler status and duct heaters. The new JCI panel will replace the existing secondary DDC panel which serves the third- floor secondary systems. These points will need to be wired to the new JCI panel. JCI will include all programming and graphics required.
- D. The controls sub-contractor will be required to participate in the Start-Up as well as the Testing, Adjusting, Balancing and Commissioning of the HVAC System. Refer to other HVAC specifications for the work required by the controls sub-contractor.
- E. The Building Management System (BMS) installer / supplier shall furnish and install a fully integrated building automation system, incorporating direct digital control (DDC) for energy management, equipment monitoring and control, and subsystems as specified. Provide a complete and fully operational system. The system shall allow the Owner to have access through the internet with password security to suite the Owner's needs. The installation of the control system shall be performed under the direct supervision of the controls manufacturer with the shop drawings, flow diagrams, bill of materials, component designation or identification number and sequence of operation all bearing the name of the manufacturer.

- F. The BMS manufacturer/supplier shall be responsible for all BMS and control and power wiring for a complete and operable system. All wiring shall be done in accordance with all local and national codes. The BMS installation must be done by personnel directly employed by the manufacturer/supplier.
- G. All existing controls, both pneumatic and electronic, are to remain operational during construction. Completely remove existing controls when existing and new equipment is under control of the new equipment.

1.3 SEQUENCE OF OPERATION

- A. Refer to Section 230905 for "Sequence of Operation" information.

1.4 DEFINITIONS

- A. DDC: Direct digital control.
- B. BMS: Building Management System.
- C. BAS: Building Automation System.
- D. EMS: Energy Management System.
- E. PC: Personal computer.

1.5 SUBMITTALS

- A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
 - 1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
 - 2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
 - 3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
 2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
 3. Wiring Diagrams: Power, signal, and control wiring.
 4. Details of control panel faces, including controls, instruments, and labeling.
 5. Written description of sequence of operation.
 6. Schedule of dampers including size, leakage, and flow characteristics.
 7. Schedule of valves including flow characteristics
 8. DDC System Hardware.
 - a. Wiring diagrams for control units with termination numbers.
 - b. Schematic diagrams and floor plans for field sensors and control hardware.
 - c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
 9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
 10. Controlled Systems:
 - a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
 - b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
 - c. Written description of sequence of operation including schematic diagram.
 - d. Points list.
- C. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.
- D. Software and Firmware Operational Documentation: Include the following:
1. Software operating and upgrade manuals.
 2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
 3. Device address list.
 4. Printout of software application and graphic screens.
 5. Software license required by and installed for the workstations and control systems.
 6. All system and software development tools are to allow the owner to independently maintain the system.
 7. Software Tools - All software tools needed for full functional use, including programming of BCs, BACnet controllers, network management and expansion, and graphical user interface development, of the BAS described within these specifications, shall be provided to the owner or his designated agent. Any licensing required by the manufacturer now and into the future, including changes

to the licensee of the software tools, and the addition of hardware corresponding to the licenses, shall be provided to allow for a complete and operational system for both normal day to day operation and servicing shall be provided. Any such changes to the designated license holders shall be made by the manufacturer upon written request by the owner or his agent. Any cost associated with the license changes shall be identified within the BAS submittals.

8. Programming Tools - Provide freely available Niagara AX Wizards to facilitate the programming and configuration of all of the BACnet devices that are provided for the HVAC and lighting control. Wizards shall be provided free of charge and be compatible with the current published versions of the network management tool that is provided as part of this project. The wizard software shall be available for public access from the manufacturer's web site. These wizard programming tools shall be compatible with at least 3 other brands of the Niagara Framework network management tools. The SI shall demonstrate as part of their prequalification as to how they intend to comply with these requirements.
- E. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1, include the following:
1. Interconnection wiring diagrams with identified and numbered system components and devices.
 2. Keyboard illustrations and step-by-step procedures indexed for each operator function.
 3. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 4. Calibration records and list of set points.

1.6 SYSTEM PERFORMANCE

- A. System shall have an open architecture utilizing the data infrastructure of fiber optic cables and/or copper cables to communicate between field panels.
- B. System server shall include the latest edition of Microsoft® windows operating system. Provide web-based browser graphic software to integrate the systems. System must be accessible remotely via the internet.
- C. Graphic software shall reside on the system server. The intent of the specification is to provide a BMS system operating with a Niagara 4 open framework which is truly open at all levels. Open by definition includes Sourcing, Product, Service and Expansion. Any contractor or integrator certified on Niagara 4 platform must be able to work on any device, network controller or supervisor without having to use other vendors to access any part of the BMS network.
- D. The graphic software shall provide a graphical representation of the building floor plan with icons/images to indicate HVAC system components and readings, generator annunciation, power metering information and locations and exterior lighting control. System software must interface with the separate systems to report activities by date, time.
- E. System shall log events for report trends, alarm conditions, etc through the Niagara software.

1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.
- B. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. **UL listed to Standards** UL864 (Fire), UL2017 (Signaling Systems), UL916 (Energy Management Systems), UL1017 (Security), UL1610 (Central Station) and UL 294 (Access Control).

1.8 CODES AND STANDARDS

- A. **Meet the requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.**
- B. **Underwriters Laboratories:** Products shall be UL-916-PAZX listed.
- C. **Federal Communications Commission -- Part J.**
- D. **ASHRAE/ANSI 135-2016 (BACnet) - (System Level Devices) - Building Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.**
- E. **ASHRAE/ANSI 135-2016 (BACnet) - (Unit Level Devices) - Unit Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.**
- F. **EIA-709.1 LonTalk Standard and EIA 901.2 (LonMark Certification) - (Unit Level Devices) - Custom Application Controllers and Application Specific Controllers shall use FTT-10A transceivers and support the LonTalk communication protocol utilizing Standard Network Variable Types (SNVT) as defined by Echelon Corporation. This standard communication protocol provides interoperability with hundreds of other various building system manufacturers' control systems and devices.**

1.9 DELIVERY, STORAGE, AND HANDLING

- A. **Factory-Mounted Components:** Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
- B. **System Software:** Update to latest version of software at Project completion.

1.10 COORDINATION

- A. **Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.**

1.11 WARRANTY

- A. The BMS supplier/installer shall warrant all work per the following:
1. All controls systems labor and materials shall be warranted to be free from defects for a period of twelve (12) months after the date of substantial completion. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no charge to the Owner. The BMS manufacturer/installer shall respond to the Owner's request for warranty service within 24 hours of the initiated call.
 2. At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the BMS is operational, and has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of the warranty period.
 3. Operator workstation software, project specific software, graphics, database, and firmware updates shall be provided to the Owner at no charge during the warranty period. Written authorization by the Owner must be granted prior to the installation of these updates.
 4. The BMS manufacturer shall provide a web-accessible Users Network for the proposed System and give the Owner free access to question/answer forum, user tips, upgrades, and training schedules for a one-year period of time correlating with the warranty period.

PART 2 - PRODUCTS

2.1 DDC EQUIPMENT

- A. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.
1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse I/O.
 - c. Monitoring, controlling, or addressing data points.
 - d. Software applications, scheduling, and alarm processing.
 - e. Testing and developing control algorithms without disrupting field hardware and controlled environment.
 3. Standard Application Programs:

- a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, anti-short cycling, PID control, DDC with fine tuning, and trend logging.
 - b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
 - c. Chiller Control Programs: Control function of condenser-water reset, chilled-water reset, and equipment sequencing.
 - d. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
 - e. Remote communications.
 - f. Maintenance management.
 - g. Units of Measure: Inch-pound and SI (metric).
4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
 5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
 6. LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.
- B. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse I/O.
 - c. Monitoring, controlling, or addressing data points.
 3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
 4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
 5. LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.
- C. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.
1. Binary Inputs: Allow monitoring of on-off signals without external power.
 2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
 3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
 4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.

5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position auto-manual switch, and manually adjustable potentiometer].
 6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
 7. Universal I/Os: Provide software selectable binary or analog outputs.
- D. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
1. Output ripple of 5.0 mV maximum peak to peak.
 2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
 3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.
- E. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:
1. Minimum dielectric strength of 1000 V.
 2. Maximum response time of 10 nanoseconds.
 3. Minimum transverse-mode noise attenuation of 65 dB.
 4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

2.2 BUILDING CONTROLLERS

- A. There shall be one or more independent, standalone microprocessor-based System Controllers to manage the global strategies described in Application and Control Software section.
- B. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.
- C. The controller shall provide a USB communications port for connection to a PC.
- D. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
- E. All System Controllers shall have a real time clock.
- F. Data shall be shared between networked System Controllers.
- G. The System Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
 1. Assume a predetermined failure mode.
 2. Generate an alarm notification.
 3. Create a retrievable file of the state of all applicable memory locations at the time of the failure.
 4. Automatically reset the System Controller to return to a normal operating mode.

- H. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at -40° F to 122° F.
- I. Clock Synchronization.
 - 1. All System Controllers shall be able to synchronize with a NTP server for automatic time synchronization.
 - 2. All System Controllers shall be able to accept a BACnet time synchronization command for automatic time synchronization.
 - 3. All System Controllers shall automatically adjust for daylight savings time if applicable.
- J. Serviceability
 - 1. Provide diagnostic LEDs for power, communications, and processor.
 - 2. The System Controller shall have a display on the main board that indicates the current operating mode of the controller.
 - 3. All wiring connections shall be made to field removable, modular terminal connectors.
 - 4. The System controller shall utilize standard DIN mounting methods for installation and replacement.
- K. Memory. The System Controller shall maintain all BIOS and programming information indefinitely without power to the System controller.
- L. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shut-down below 80% nominal voltage.
- M. Uninterruptible Power Supply: 1.5kVA. Provide 30 mins of backup power after loss of power.
- N. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs with a minimum BACnet Protocol Revision of 14.

2.3 UNITARY CONTROLLERS

- A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.
 - 1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72-hour battery backup.
 - 2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock. Perform automatic system diagnostics; monitor system and report failures.
 - 3. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on

network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.

4. BACnet Compliance: Communicate using EIA/CEA 709.1 datalink/physical layer protocol using LonTalk protocol.
5. Enclosure: Waterproof rated for operation at 40 to 150 deg F.

2.4 PROGRAMMABLE CONTROLLERS (PC)

- A. Performance – Each PC shall have a minimum of 64K of Non-volatile Flash memory for control applications and 128K non-volatile flash memory for storage with an 8-bit processor. The PC shall have a minimum ambient operating temperature range of -0°C to 70°C or 32°F to 158°F.
- B. Inputs – Analog inputs shall have the following minimum level of performance: 16-bit A to D resolution; allow monitoring of platinum 100 ohms, platinum 1000-ohm, nickel 1000 ohms, thermistor 10K type II, thermistor 10K type III, voltage input 0-10VDC, current input 4-20mA, digital input, pulsed input minimum 2 Hz.
- C. Outputs – Outputs shall be either software configurable to be either analog or digital or dedicated digital only – Analog outputs shall be selectable as voltage of 0-10 VDC (linear) or 4-20mA or Digital outputs shall be 0-12 VDC (off/on), floating or PWM. Outputs shall have an adjustable range of 2 seconds to 15 minutes. Output Resolution shall be a minimum 8 bits digital/analog converter. All individual outputs and power supply shall be protected by an auto reset fuse. There shall be an LED status indicator on each of the outputs.
- D. Programmable Controller Features:
 1. Provide an onboard network communication jack.
 2. The PC shall be provided with a diagnostic indicator lights for power and network communication of transmit and receive along with a light indication position for each output.
 3. Hand/Off/Auto Switches – For all controllers applied to an AHU, Chiller, Pumps, Cooling Tower or Boiler, provide for the manual override and adjustment of all Analog and Digital outputs through a three-position switch giving the selection of Hand, Off and Auto (HOA). A HOA shall be provided for each separate digital and analog output from the controller and be an integral part of the controller. HOA switches external from the controller shall not be accepted. For the Analog outputs the Hand position of the switch shall provide for the adjustment of the output signal through a linear scaled potentiometer. The position of the HOA shall be monitored and an alarm shall be delivered to the Graphical User Interface should the switch be in an Off or Hand position. An indicating LED shall be provided on the controller for each HOA indicating position of the switch. For all Analog outputs, the indicating LED shall provide a linear indication of the position of the Potentiometer through a variation in the intensity of the indicator LED and be provided as a numerical value that can be viewed at the Graphical User Interface.
 4. Enclosures – Provide for a plastic enclosure with a separate back plate with terminals such that the electronic portion of the controller can be easily removed for ease of installation and servicing.
- E. Fan-Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum

fan speed. Controller shall briefly apply full voltage, when motor is started, to rapidly bring motor up to minimum speed. Equip with filtered circuit to eliminate radio interference.

2.5 ELECTRONIC SENSORS

- A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
- B. Humidity Sensors: Bulk polymer sensor element.
 - 1. Accuracy: 2 percent full range with linear output.
 - 2. Room Sensor Range: 20 to 80 percent relative humidity.
 - 3. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - a. Set-Point Adjustment: Concealed.
 - b. Set-Point Indication: Concealed.
 - c. Color: color selected from manufacturer's full range.
 - 4. Duct Sensor: 20 to 80 percent relative humidity range with element guard and mounting plate.
 - 5. Outside-Air Sensor: 20 to 80 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of minus 22 to plus 185 deg F.
 - 6. Duct and Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.
- C. Pressure Transmitters/Transducers:
 - 1. Static-Pressure Transmitter: Non-directional sensor with suitable range for expected input, and temperature compensated.
 - a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
 - b. Output: 4 to 20 mA.
 - c. Building Static-Pressure Range: 0- to 0.25-inch wg.
 - d. Duct Static-Pressure Range: 0- to 5-inch wg.
 - 2. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure.
 - 3. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure and tested to 300-psig.
 - 4. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
 - 5. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system.

2.6 ROOM TEMPERATURE SENSORS

- A. Room Temperature Sensor: sensor shall be of the resistance/thermistor type. Accuracy shall be +/- 5 degrees F. Room sensors shall be recessed wall box mounting and provided with the following:
 - 1. Override pushbutton, which can be programmed in the system to a maximum number of minutes of override.
 - 2. LCD display to indicate sensed values
 - 3. Setpoints warmer/cooler adjustment, which can be programmed in the system to a maximum number of +/- degrees of adjustment
 - 4. Temperature sensing
 - 5. CO2 sensing where required.

2.7 STATUS SENSORS

- A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.
- B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.
- C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.
- D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.
- E. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.
- F. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.
- G. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.
- H. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

2.8 ACTUATORS

- A. Provide actuators for all motorized hydronic control valves and motorized control dampers.
- B. Actuators for hydronic valves shall be capable of closing against system pump head. Actuators for control dampers shall produce sufficient power and torque to close off against the maximum system pressures encountered. Actuators shall be sized to close off against the fan shutoff pressure as a minimum requirement.
- C. Modulating valves and dampers: provide proportional modulating control capable of positioning the valve or damper at all points across the full range of operation with

continuous control action. The sensor, controller and control device (damper, valve, etc.) shall act as one unit to maintain a constant and precise control of the controlled medium. Actuator drives proportional to input signal and modulates throughout its angle of rotation.

- D. Two-position valves and damper: provide two-position actuators only where indicated.
- E. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
 - 1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
 - 2. Non-spring Return Motors for Valves Larger than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
 - 3. Spring-Return Motors for Valves Larger than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.
 - 4. Non-spring Return Motors for Dampers Larger than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
 - 5. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft. Size for running and breakaway torque of 150 in. x lbf.
- F. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
 - 1. Provide full modulating damper and valves actuators unless otherwise noted.
 - 2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
 - 3. Dampers: Size for running torque calculated as follows:
 - a. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
 - b. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
 - c. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
 - 4. Coupling: V-bolt and V-shaped, toothed cradle.
 - 5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
 - 6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on non-spring return actuators.
 - 7. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.

2.9 CONTROL VALVES

- A. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated. Heating system control valves are to fail in the closed position and chilled water system fails are to fail in the last position.
- B. Terminal Unit Control Valves: Bronze body, bronze trim, two or three ports, replaceable plugs and seats, and union and threaded ends.

1. Rating: Class 125 for service at 125 psig and 250 deg F operating conditions.
2. Sizing: 3-psig maximum pressure drop at design flow rate, to close against pump shutoff head.
3. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

2.10 PRESSURE TRANSDUCERS

- A. Transducer shall have linear output signal. Zero and span shall be field adjustable. Sensor accuracy shall be 1 percent of full scale with repeatability/long-term stability of 0.25 percent.
- B. Transducer sensing elements shall withstand continuous operating conditions of positive or negative pressure 50% greater than calibrated span without damage.
- C. Water pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Transducer shall be complete with 4 to 20 mA output, required mounting brackets, and block and bleed valves.
- D. Water differential pressure transducer shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (differential pressure) and maximum static pressure shall be 300 psi. Transducer shall be complete with 4 to 20 mA output, required mounting brackets, and five-valve manifold.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Electrical Power:
 1. Verify that power supply is available to the operator workstation, all actuators, valves and all other components of the HVAC Control System. Where required, provide low and/or line voltage power from the nearest electrical panel.
 2. Unless noted otherwise, line voltage power for system equipment shall be derived from the nearest electrical panel, and shall not be common with other HVAC, plumbing, electrical or architectural equipment. Unless noted otherwise, low voltage power shall be derived from transformers/drivers associated with the system equipment only, and shall not be connected to control power transformers associated with other HVAC equipment (i.e. air handling units, chillers, etc.). System equipment may share transformers/drivers with other system equipment, provided the transformers/drivers are sized to handle the total load.
 3. Control panels for equipment being fed from the emergency generator, including, but not limited to boilers, heating pumps, selected air handling and terminal equipment, etc., power shall be derived from the nearest 120/208 volt normal/emergency panel. Verify equipment that is connected to emergency power with the Electrical Contractor.
 4. Install all power wiring and cable per the National Electric Code and applicable Division 26 Sections. Install raceways, boxes, cabinets according to Division 26 Sections.

5. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
 6. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position on all equipment except variable air volume air handling units.
- B. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- C. Connect and configure equipment and software to achieve sequence of operation specified.
1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
- G. Furnish and Install hydronic instrument wells, valves, and other accessories where required.
- H. Install refrigerant instrument wells, valves, and other accessories where required.
- I. Space Sensor(s):
1. Verify location of thermostats, humidistats, and other control sensors with Drawings and room details before installation. Mount sensors in occupied spaces to match mounting height of light switches unless otherwise indicated on Drawings. Mounting height shall comply with codes and accessibility requirements.
 2. Conceal assembly in an electrical box of sufficient size to house sensor and transmitter, if provided.
 3. Install electrical box with a faceplate to match sensor cover if sensor cover does not completely cover electrical box.
 4. In finished areas, recess electrical box within wall.
 5. In unfinished areas, electrical box may be surface mounted if electrical light switches are surface mounted.
 6. Align electrical box with other electrical devices such as visual alarms and light switches located in the vicinity to provide a neat and well-thought-out arrangement. Where possible, align in both horizontal and vertical axis.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust all control system components. Report results in writing to the owner's representative.
- B. Perform the following field tests and inspections and prepare test reports:
1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
 2. Test and adjust controls and safeties.

3. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
4. Test each point through its full operating range to verify that safety and operating control set points are as required.
5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
6. Test each system for compliance with sequence of operation.
7. Test software and hardware interlocks.

C. DDC Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check instrument tubing for proper fittings, slope, material, and support.
5. Check installation of air supply for each instrument.
6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
8. Check temperature instruments and material and length of sensing elements.
9. Check control valves. Verify that they are in correct direction.
10. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
11. Check DDC system as follows:
 - a. Verify that DDC controller power supply is from emergency power supply, if applicable.
 - b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
 - c. Verify that spare I/O capacity has been provided.
 - d. Verify that DDC controllers are protected from power supply surges.

- D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.3 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:

- a. Check analog inputs at 0, 50, and 100 percent of span.
 - b. Check analog outputs using milliamper meter at 0, 50, and 100 percent output.
 - c. Check digital inputs using jumper wire.
 - d. Check digital outputs using ohmmeter to test for contact making or breaking.
 - e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
5. Flow:
- a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
 - b. Manually operate flow switches to verify that they make or break contact.
6. Pressure:
- a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
 - b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
7. Temperature:
- a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
 - b. Calibrate temperature switches to make or break contacts.
8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.
- B. Adjust initial temperature and humidity set points.

3.4 DEMONSTRATION AND ON-SITE ASSISTANCE

- A. Pre-installation demonstration: The Controls Manufacturer/Installer shall provide a complete demonstration of the proposed control system software architecture prior to final programming of the software. This demonstration is required to have the owner's representative agree on the system architecture. The method and location of the demonstration shall be acceptable to the owner. The Controls Manufacturer/Installer will be required to make any changes in the proposed system architecture, if desired by the owner's representative.

- B. Post installation demonstration: provide documented (paper or electronic) proof of testing prior to scheduling post-installation demonstration. Documentation to provide proof of testing/verification of all system inputs and outputs, including verification of analog input values (temp, CO2, etc.) with independent handheld NIST calibrated device. Post installation testing will engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. The training shall be comprised of a minimum of 40 hours on-site training at a time suitable to the owner's representative.

- C. On-site assistance: during the warranty period, the Controls Manufacturer/Installer shall provide additional on-site assistance for training and re-programming, when requested by the owner. This on-site assistance shall be for a period of 8 hours for each visit, with a total of 4 visits.

- D. The Contractor shall be responsible to video record each trained presentation session with the owner and the manufacturer and turn over DVD's to owner after completion of training session. The Contractor shall obtain a signed receipt for the DVD's proving the owner received the DVD. If a copy of the receipt cannot be turned over and validated when requested, the contractor shall be responsible to provide additional training sessions as requested. A generic training DVD shall be acceptable in lieu of recording the owner's training session; however, this does not absolve the contractor of providing a private training session with the owner.

END OF SECTION 23 09 00

SECTION 23 09 05 - SEQUENCE OF OPERATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes control sequences. Sequence of operation is hereby defined as the manner and method by which various controls and systems function. The requirements for the operation each type of control system is specified in this section and/or on the contract drawings.

1.3 SUBMITTALS

- A. The control system supplier/installer shall review all HVAC equipment shop drawings prior to their shop drawing submission. The supplier shall note in the submission that all relative shop drawings have been reviewed prior to submission to the engineer.
- B. Shop Drawings: Submit shop drawings containing the following information:
 - 1. Schematic flow diagram of system showing fans, pumps, coils, dampers, valves, and control devices.
 - 2. Label each control device with setting or adjustable range of control.
 - 3. Indicate difference between factory and field wiring.
 - 4. Indicate each control panel required, with internal and external piping and wiring clearly indicated. Provide detail of panel face, including controls, instruments, and labeling.
 - 5. Include verbal description of sequence of operation.
 - 6. Maintenance Data: Include copy of all shop drawings in each maintenance manual.
 - 7. When preparing submittals and programming, use a room number schedule generated by the architect and/or the owner, which indicates the actual room numbers that will be used when the building is occupied. If the schedule is not available, revise the initial submittal, when a schedule is available, to reflect the proper room numbers.

PART 2 - GENERAL

NOT APPLICABLE.

PART 3 - EXECUTION

3.1 BUILDING MANAGEMENT SYSTEM

- A. **BASE BID** - The BAS system for the building shall be by the VRF equipment manufacture. Refer to specification section 238020. The VRF control panel shall have communication card to integrate with the building JCI control system. Provide a communication card in the existing Daikin 3rd floor control panel. In addition, provide a separate DDC control panel, (BACnet/IP), for secondary systems including, but not limited to, unit heaters, cabinet heaters, convectors, pump status, boiler status and duct heaters. Secondary system must communicate with the building VRF system.

- B. **ALTERNATE BID M-3** – Provide a JCI control system that shall fully integrate with the VRF control panel specified with this project as well as the existing Daikin panel for the third floor. The HC will have to include replacing the existing communication card in the existing Daikin panel. In addition, JCI will provide a separate DDC control panel, (BACnet/IP), for secondary systems including, but not limited to, unit heaters, cabinet heaters, convectors, pump status, boiler status and duct heaters. Under this alternate the new JCI panel will replace the existing secondary DDC panel which serves the third- floor secondary systems. These points will need to be wired to the new JCI panel. JCI will include all programming and graphics required.

- C. The BMS shall include all hardware, software and programming required to fully execute all control sequences and monitor all control points described in this specification. The BMS shall have the capabilities to perform the control strategies, energy management functions, and building management functions. All BMS software shall reside on the Operator Workstation to be located within the building at a location to be determined.
 - 1. Set Point Control: The BMS shall have full editing capabilities for any set point listed in these control sequences regardless of whether set point control logic resides in a local control unit or the building management software. All controls shall be capable of fully executing all control sequences in the event of a communication loss between the BMS operator workstation and any local control unit(s).
 - 2. Operating Mode Control: The BMS shall have full 24 hr./ 365-day scheduling capabilities for occupied/unoccupied modes of operation for all systems regardless of whether sequencing logic resides in a local control unit or the building management software. Provide programming that utilizes various global commands for zoning portions of the building as required by the owner. The control system shall be capable of fully executing all schedule sequences in the event of a communication loss between the operator workstation and any local control unit(s).
 - 3. Control Offset: The BMS shall be capable of offsetting the control set points for any heating/cooling system equipment by an operator adjustable amount. This capability will allow for automatic set point changes based on system requirements, such as demand limiting.
 - 4. Alarm Management: The BMS shall monitor, buffer, and direct alarm reports to operator devices and memory files. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of three (3) priority levels shall be provided. Each local control unit as well as the BMS software shall be capable of performing distributed, independent alarm analysis and filtering based on priority level.
 - a. The conditions under which alarms need to be acknowledged by an operator, and/or sent to follow-up files for retrieval and analysis at a later date shall be definable by the user.

- b. Report Routing: Alarm, reports, messages, and files will be directed to a user-defined list of operator devices for archiving alarm information. Alarms shall also be automatically directed to a default device in the event a primary device is found to be off-line.
 - c. Alarm Messages: In addition to the point's descriptor and the time and date, the user shall be able to print, display or store a 65-character alarm message to more fully describe the alarm condition or direct operator response.
 - d. Auto-Dial Alarm: The user shall define which critical alarms shall initiate a call to a remote operator device.
5. Historical Data and Trend Analysis: The BMS shall be capable of automatically sampling, storing, and displaying system data in all of the following ways:
- a. Continuous Point Histories: A point history routine shall continuously and automatically sample the value of all analog and binary inputs and outputs at fifteen-minute intervals. Samples shall be stored for the past 72 hours to allow the user to immediately analyze equipment performance and all problem-related events. History files shall include a continuous record of the last ten status changes or commands for each point.
 - b. Control Loop Performance Trends: Operator adjustable resolution sampling of 10-300 seconds in 1-second increments for verification of control loop performance.
 - c. Extended Sample Period Trends: Measured and calculated analog and binary data shall also be assignable to user-definable trends for the purpose of collecting performance data over extended periods of time. Sample intervals of 1-minute to 2-hours, in 1-minute intervals, shall be provided.
 - d. Data Storage and Archiving: Trend data shall be uploaded from local unit controllers to the Operator Workstation at user-defined intervals or when the trend buffers become full. All trend data shall be available in disk file form for use in third party personal computer applications.
6. Totalization: The BMS shall be capable automatically accumulating, storing, and displaying totals as follow:
- a. Runtime: Automatically accumulate, store, and display runtime hours for binary input and output points as specified in sequence of operations specifications. The totalization routine shall have a sampling resolution of 1-minute or less. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.
 - b. Analog/Pulse: Automatically sample, calculate, store and display consumption totals on a daily basis for user selected analog and binary pulse input-type points. The totalization routine shall have a sampling resolution of 1-minute or less. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.
 - c. Event: Automatically count, store, and display event occurrences (such as the number of times a pump or fan system is cycled) on a daily basis for user selected events.

3.2 BOILER SYSTEM

- A. The two new condensing boilers shall be equipped with a boiler sequence controller. The boiler manufacture shall provide a common supply water temperature sensor which shall modulate and sequence the boilers to maintain an adjustable loop temperature. The boiler manufacturer shall

also furnish an outdoor air temperature sensor to be mounted on the outside of building and wired to the control panel. This will start and stop the boiler operation sequence. The boiler sequence controller shall also control the primary and secondary boiler pumps.

- B. Provide CT on pumps for pump status.
- C. Emergency Burner Control: Provide a complete operational system for emergency burner switches, as required by code, at all exit doors, to interrupt fuel feed and electric power to all fuel fired equipment located within the boiler room.
- D. The BMS shall display the following monitoring points on a custom graphic at the operator workstation:
 - 1. Boiler status - indication and alarm.
 - 2. Heating supply and return water temperature, each boiler - indication.
 - 3. Primary pump status – indication and alarm.
 - 4. Secondary Pump status - indication and alarm. (provide CT)

3.3 VRF SYSTEM CONTROL SEQUENCE

- A. The control system for the VRF system shall be by the manufacture. This system includes the indoor evaporator units, branch selector box, and energy recovery units. Refer to section 238020 for sequence and points.
- B. The software in the VRF panel shall communicate with the JCI system. This will be required for the panel being provided for this project as well as the panel that was provided with the third-floor renovation.
- C. The electric duct heaters shall be controlled by a stand-alone duct temperature sensor. The duct heaters alarm contact shall be wired to an additional DDC panel for alarm notification. This panel must communicate with the VRF control system.
- D. The BMS shall display the following monitoring points on a custom graphic at the operator workstation:
 - 1. VRF System - Refer to section 238020.

3.4 TERMINAL UNIT CONTROL

- A. Cabinet Heater Control: Provide sensor to maintain the occupied and unoccupied space temperature by cycling the fan motor.
- B. Convectors: Provide a room sensor to maintain occupied and unoccupied space temperature by opening the two-position heating control valve.
- C. Unit Heater: Provide single-temperature room sensor to cycle fan motor to maintain occupied and unoccupied space temperature.
- D. The BMS shall display the following monitoring points on a custom graphic at the operator workstation:

1. Space set point - indication and adjustment.
2. Space temperature – indication and alarm.

END OF SECTION 23 09 05

SECTION 23 16 20 – 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. This section includes natural gas piping, valves and accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Piping materials and specialties.
 - 2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 3. Pressure regulators. Indicate pressure ratings and capacities.
- B. Welding certificates.
- C. Operation and Maintenance Data: For gas valves and other accessories.

1.4 QUALITY ASSURANCE

- A. The installation shall conform to the requirements of the 2009 International Fuel Gas Code and the requirements of the local utility company. Verify the code with requirements with the local utility before beginning the work.
- B. Refer to the International Fuel Gas Code, Section 107, for the requirements of Inspections and Testing. Coordinate requirements with the applicable code officials and the utility company representatives.
- 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.

1.5 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.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to any portion of the existing occupied facilities until receiving permission. If interruption of the existing service is required, coordinate the work with the Owner and, if necessary, perform the work at a time, other than normal working hours, which is suitable to the owner.

1.7 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.
- C. Coordinate and schedule the main gas service installation with the local utility supplier. Prepare any permits and/or applications that may be required by the utility.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40.
 - 1. Malleable-Iron Threaded Fittings: ASME B1.20.1.
 - 2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding."

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 (3.45 kPa).
 - 6. End Fittings: Zinc-coated steel.
 - 7. Threaded Ends: Comply with ASME B1.20.1.
 - 8. Maximum Length: 72 inches (1830 mm).
- B. Quick-Disconnect Devices: Comply with ANSI Z21.41.
 - 1. Copper-alloy convenience outlet and matching plug connector.
 - 2. Nitrile seals.
 - 3. Hand operated with automatic shutoff when disconnected.
 - 4. For indoor or outdoor applications.
 - 5. Adjustable, retractable restraining cable.

- C. 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 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
 - 3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - 4. CWP Rating: 125 psig (862 kPa).

- D. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for 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.

2.4 MANUAL GAS SHUTOFF VALVES

- A. Shut off valves are to conform to the requirements of the International Fuel Gas Code and the following standards, depending on gas pressure and application:
 - 1. ANSI Z21.15.
 - 2. ASME B16.44
 - 3. ASME B16.33

- B. General Requirements for Valves, NPS 2 and Smaller: Comply with ASME B16.33.
 - 1. CWP Rating: 125 psig (862 kPa).
 - 2. Threaded Ends: Comply with ASME B1.20.1.
 - 3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
 - 4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - 5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch (25 mm) and smaller.
 - 6. Service Mark: Valves 1-1/4 inches (32 mm) to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

- C. General Requirements for Metallic Valves, NPS 2-1/2 (DN 65) and Larger: Comply with ASME B16.33.
 - 1. CWP Rating: 125 psig (862 kPa).
 - 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. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Body: Bronze, complying with ASTM B 584.
2. Ball: Chrome-plated bronze.
3. Stem: Bronze; blowout proof.
4. Seats: Reinforced TFE; blowout proof.
5. Packing: Threaded-body packnut design with adjustable-stem packing.
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 (4140 kPa).
8. Listing: Valves NPS 1 (DN 25) 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.

2.5 PRESSURE REGULATORS

A. 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: 5 psig.

B. 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: 5 psig.

2.6 DIELECTRIC FITTINGS

A. Dielectric Unions:

1. Minimum Operating-Pressure Rating: 150 psig (1034 kPa).
2. Combination fitting of copper alloy and ferrous materials.
3. Insulating materials suitable for natural gas.
4. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

2.7 LABELING AND IDENTIFYING

- A. Provide pipe identification for all gas piping installed within the building. The identification markers shall have a yellow label with the word "GAS" marked in black letters. Spacing shall be per the requirements of the International Fuel Gas Code. Where there are two or more meters the piping for each system shall be labeled so that the piping system supplied by each meter is identifiable.

PART 3 - EXECUTION

3.1 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 5 PSIG

- A. Aboveground branch piping shall be:
 - 1. Steel pipe with malleable-iron fittings and threaded joints.
 - 2. Steel pipe with wrought-steel fittings and welded joints.

3.2 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Two-piece, full-port, bronze ball valves with bronze trim.

3.3 EXAMINATION

- A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 INDOOR PIPING INSTALLATION

- A. Comply with NFPA 54 and the International Fuel Gas Code 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. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Locate valves for easy access.

- F. Install natural-gas piping with a slope conforming to the requirements of the International Fuel Gas Code. Install piping free of sags and bends. Install fittings for changes in direction and branch connections.
- G. 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 (75 mm) long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- H. 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.
- I. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- J. Connect branch piping from top or side of horizontal piping.
- K. 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.
- L. Do not use natural-gas piping as grounding electrode.
- M. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.5 VALVE INSTALLATION

- A. Install a manual gas shutoff valve, in an accessible location, at the gas connection to all gas fired equipment and/or gas fueled appliances. Shutoff valves to be installed per the following requirements:
 - 1. The valve is to be located within the same room as the equipment.
 - 2. The valve is to be located within 6'-0" of the equipment.
 - 3. The valve shall be installed upstream of the union, connector or disconnect device.
- B. Shutoff valves connected to emergency generators and other gaseous fueled equipment are to be installed per NFPA 37.
- C. Install pressure regulators with maintenance access space that is adequate for servicing and testing of the regulator.
- D. Install pressure regulators at locations suitable to the installation instructions provided by the connected equipment manufacturer. Verify requirements prior to installation.

3.6 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

B. 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.

3.7 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports shall conform to the requirements of MSS SP-58.
- B. Support vertical piping at base and at each floor with a maximum spacing of 120".
- C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 1. NPS $\frac{3}{4}$ and NPS 1: Maximum span, 96 inches.
 2. NPS 1-1/4 and larger: Maximum span, 120 inches.

3.8 CONNECTIONS

- A. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- B. Install piping adjacent to appliances to allow service and maintenance of appliances.
- C. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches (1800 mm) of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

- A. Provide Identification and Labeling of all gas piping systems and components as required by the International Fuel Gas Code.
- B. Install detectable warning tape directly above gas piping, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below sub-grade under pavements and slabs.

3.10 FIELD QUALITY CONTROL

- A. Perform all required tests and inspections. Refer to Section 406 of the International Fuel Gas Code for requirements.
- B. Natural-gas piping will be considered defective if it does not pass tests and inspections.

- C. Prepare test and inspection reports.

3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

END OF SECTION 23 16 20

SECTION 23 21 10 - HYDRONIC 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. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the piping systems.
- B. Water treatment work is part of the HVAC contract and shall be completed by the HC.

1.3 SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
 - 2. Air control devices.
 - 3. Hydronic specialties.
 - 4. Grooved joint pipe couplings and fitting.
 - 5. Water Treatment provider.
- B. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. The installation is to conform to the requirements of the 2015 International Mechanical Code and any applicable local codes. Verify local code requirements with the Authority Having Jurisdiction.
- B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 01.
- D. All grooved joint couplings, fittings, valves and other specialties shall be provided from a single manufacturer. Grooving tools shall be from the same manufacturer as the grooved components. All castings used for coupling housings, valve bodies, fittings, etc. shall be date stamped for traceability and quality control.

- E. Pressure seal piping systems: Installer shall be a qualified installer, licensed within the jurisdiction, and familiar with the installation of the copper press joint system. The copper press fittings shall be installed using the proper tool, actuator, jaws and rings as instructed by the press fitting manufacturer. The installation of copper tubing in Hydronic systems shall conform to the requirements of the ICC International Mechanical Code.

1.5 EXTRA MATERIALS

- A. Water-Treatment Chemicals: Furnish enough chemicals for initial system startup and for preventive maintenance for one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
 - 1. Hot-Water Heating Piping: 125 psig at 200 deg. F.
 - 2. Air-Vent Piping: 200 deg. F.
 - 3. Condensate-Drain Piping: 150 deg. F.
 - 4. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- B. Wrought-Copper Fittings and Unions: ASME B16.22.
- C. DWV Copper Tubing: ASTM B 306, Type DWV.

2.3 PRESSURE SEAL PIPING SYSTEMS

- A. Subject to compliance with requirements, provide products manufactured by Veiga LLC or NIBCO Inc.
 - 1. Copper tubing shall conform to ASTM B 75 or ASTM B88.
 - 2. Copper fittings shall conform to ASME B16.18, ASME B16.22 or ASME B16.26.
 - 3. Press Fitting: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed.
 - 4. System to have minimum 200-psig working-pressure rating at 250 deg F.

2.4 MECHANICALLY FORMED EXTRUDED OUTLETS IN COPPER TUBE

- A. Subject to compliance with requirements, provide products manufactured by T-Drill Industries. System to be installed per manufacturer's installation requirements. Installer shall be factory trained and certified in the installation of the system. Provide proof of training prior to beginning the installation.

- B. Piping system shall be Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- C. Code Compliance:
 - 1. ASME B31.9 - 2011 Building Services Piping - Section 930.2 Mechanically Formed Extruded Outlets
 - 2. Copper fittings shall conform to ASME B16.18, ASME B16.22 or ASME B16.26.
 - 3. System to have minimum 200-psig working-pressure rating at 250 deg F.
- D. Mechanically formed extruded outlets shall be perpendicular to the axis of the run tube (header). They shall be formed by drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the branch wall. Joints shall be made with the use of approved brazing alloys.

2.5 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53, black steel with plain ends; type, grade, and wall thickness as indicated in Part 3 "Piping Applications" Article.
- B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in Part 3 "Piping Applications" Article.
- C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in Part 3 "Piping Applications" Article.
- D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 "Piping Applications" Article.
- E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in Part 3 "Piping Applications" Article.
- F. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
- G. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1. Material Group: 1.1.
 - 2. End Connections: Butt welding.
 - 3. Facings: Raised face.
- H. Grooved Mechanical-Joint Piping Systems:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by Victaulic Company of America or Anvil International.
 - 2. Steel Pipe: ASTM A 53, carbon steel, schedule 40, roll or cut grooved ends.
 - 3. Fittings: ASTM A 395, grade 65-45-12 ductile iron; ASTM A 536, grade 65-45-12 wrought steel conforming to ASTM A-235/A 53M, Type F, E, or S, Grade B factory fabricated steel; or ASTM A 234, Grade WPB steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, to secure grooved pipe and fittings.
 - 4. Couplings: Ductile iron conforming to ASTM A-536, Grade 65-45-12.
 - a. NPS 2 through NPS 8; rigid coupling with high temperature range (-30 degrees F to 250 degrees F; Grade EP EPDM gasket.

- b. NPS 10 through NPS 12; rigid coupling with Grade EP EPDM gasket (-30 degrees F to 230 degrees F).
- c. NPS 2 through NPS 12: flexible coupling for use in locations where vibration attenuation and stress relief is required. Three flexible couplings may be used in lieu of a flexible connector.

I. Mechanical-Joint Piping Systems:

- 1. Manufacturers: Victaulic Company of America, Quick-Vic Systems.
- 2. Steel Pipe: ASTM A 53, schedule 40.
- 3. Couplings and Fittings: ASTM A 536, grade 65-45-12.
- 4. Gaskets: Grade EHP EPDM (-30 degrees F to +250 degrees F).

2.6 PEX-a HYDRONIC PIPE AND FITTINGS

A. Manufacture: Uponor.

B. Performance Requirements: PEX-a piping and fittings shall meet the following pressure and temperature ratings:

- 1. 200 degrees F at 80 psi.
- 2. 180 degrees F at 100 psi.
- 3. 3.4 degrees F at 160 psi.

C. Pipe and Fittings:

- 1. PEX-a (Engle-method Crosslinked Polyethylene) Piping: Uponor Wirsbo hePEX , ASTM 876 with oxygen-diffusion barrier that meets DIN 4726.
- 2. PEX-a Fittings, Elbows and Tees (through 3 inch nominal pipe size): ASTM F1960 cold-expansion fitting manufactured from the following material types:
 - a. UNS No. C69300 Lead-free (LF) Brass.
 - b. 20 percent glass-filled polysulfone as specified in ASTM D6394.
 - c. Unreinforced polysulfone (group 01, class 1, grade 2) as specified in ASTM D6394.
 - d. Polyphenylsulfone (group 03, class 1, grade 2) as specified in ASTM D6394
 - e. Blend of polyphenylsulfone (55-80%) and unreinforced polysulfone (rem.) as specified in ASTM D6394.
 - f. Reinforcing cold-expansion rings shall be manufactured from the same source as PEX-a piping manufacturer and marked "F1960".
- 2. Provide plastic-to-metal transition fittings and unions manufactured by Uponor.

2.7 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

- 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. 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.
- E. Grooved Joint Lubricants: lubricate gaskets using a lubricant supplied by the coupling manufacturer. Lubricant shall be suitable for the gasket elastomer and fluid media.
 - 1. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

2.8 EXPANSION FITTINGS AND COMPENSATORS

- A. Grooved Mechanical-Joint Piping Systems:
 - 1. Victaulic Style 150 Mover slip type expansion joint with 3" axial movement. Designed for service temperature to 230 degrees F and a working pressure of 350 psi maximum. Provide Grade "E" EPDM gaskets.
 - 2. Victaulic Flexible Loop Series 159 with 4' axial movement: Designed for service temperatures to 350 degrees F. maximum and working pressure of 150 psi. Schedule 40 carbon steel end connections and 321 stainless steel corrugated hose.
- B. Welded or Soldered Joint Piping Systems: Provide in-line expansion compensators manufactured by Hyspan Precision Products or Metraflex Inc. Compensators to be rated for a maximum pressure of 175 psi and 230 degrees F. operating temperature.

2.9 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper-alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Flanges:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Factory-fabricated companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- D. Dielectric Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Calpico, Inc.
 - b. Lochinvar Corporation.
2. Galvanized-steel coupling with inert and non-corrosive thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg. F.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Perfection Corporation; a subsidiary of American Meter Company.
 - b. Victaulic Company of America.
2. Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg. F.

2.10 VALVES AND SPECIALTIES

A. Calibrated Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. IMI Flow Design Inc. Model UA
 - b. NuTech Model MB/MBF/MBG
2. Valves ½" to 2": to have venturi type bronze body, chrome plated ball, EPDM seals. Provide pressure & temperature test ports across valve measurement area. Ports to be fitted with dual durometer EPDM cores, brass cap & O-ring seal. Valves to have drain/purge port. Provide valve with memory stop, memory lock and calibrated position indicator. Valves to be rated at 200 PSIG at 2500 F and be 100% positive shut-off. Measurement accuracy to be +/- 3%.

B. System Fill Pressure-Reducing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amtrol, Inc.
 - b. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Bronze body construction with NPT threaded inlet and outlet connections, a tight seating check valve, purge lever for manual purging, and built-in integral strainer. High capacity performance suitable for use in hydronic heating and cooling systems. Maximum Pressure: 100psi.

C. Safety Relief Valves (Diaphragm-Operated):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amtrol, Inc.

- b. Armstrong Pumps, Inc.
 - c. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
- 2. Body: for NPT ¾" and 1", Bronze with 125 PSIG maximum working pressure and 250 degree F. maximum operating temperature.
 - 3. Body: for NPT 1 ½" and 2", Cast Iron with 50 PSIG maximum working pressure and 250 degree F. maximum operating temperature.
 - 4. Diaphragm and Seat: EPDM.
 - 5. Wetted, Internal Work Parts: Brass.
 - 6. Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.
- D. Reduced-Pressure-Principle Backflow Preventers: Drawing Tag "RPB"
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ames Co.
 - b. Conbraco Industries, Inc.
 - c. Watts Industries, Inc.; Water Products Div.
 - d. Zurn Plumbing Products Group; Wilkins Div.
 - 2. Standard: ASSE 1013.
 - 3. Operation: Continuous-pressure applications.
 - 4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
 - 5. Temperature range: 210 degrees F.
 - 6. Size: as indicated on the drawings.
 - 7. Pressure Loss and Design Flow Rate: as indicated on the drawings.
 - 8. Body: Lead free bronze construction for NPS 2 and smaller; epoxy coated cast iron complying with AWWA C550 and FDA approved for NPS 2-1/2 and larger.
 - 9. Accessories: Ball type valves on inlet and outlet of NPS 2 and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger. Provide strainers on the inlet. Provide Air-Gap Fitting, ASME A112.1.2, matching backflow-preventer connection.
- E. Backflow Preventers: Drawing Tag "BP"
- 1. Provide a Series 9D Dual Check Backflow Preventer manufactured by Watts Industries or equal as manufactured by one of the following:
 - a. Ames Co.
 - b. Conbraco Industries, Inc.
 - c. Zurn Plumbing Products Group; Wilkins Div.
 - 2. Standard: ASSE 1012.
 - 3. Temperature range: 33° F to 250° F.
 - 4. Size: as indicated on the drawings.
 - 5. Working Pressure: 25 to 175 psi.
 - 6. Body: forged brass.
- F. Mechanical Sleeve Seals:
- 1. Manufacturers: The Metraflex Co. of Flexcraft Industries.

2. Description: Pipe wall penetration seals to be of the modular link type. Seals shall consist of a series of interlocking, molded synthetic rubber links, with heavy-duty plastic pressure plates, and corrosion resistant nuts and bolts. Seals to be designed to provide a hydrostatic seal between the pipe and wall penetration. Seals shall be sized and selected per manufacturer recommendations. Mechanical pipe seals shall be fabricated of an EPDM elastomer for general service and a Nitrile/ Buna-N for hydrocarbon/petroleum based applications. Provide stainless steel hardware as required.
3. Steel wall sleeve: Cast in place concrete wall sleeves to be fabricated from galvanized heavy wall welded or seamless carbon steel pipe. All sleeves to have a 2" wide, full perimeter water stop, welded on both sides.

2.11 AIR CONTROL DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Amtrol, Inc.
 2. Bell & Gossett Domestic Pump; a division of ITT Industries.
 3. Taco.
- B. Manual Air Vents:
 1. Body: Bronze.
 2. Internal Parts: Nonferrous.
 3. CWP Rating: 150 psig (1035 kPa).
 4. Maximum Operating Temperature: 225 deg. F.
- C. Automatic Air Vents:
 1. Body: Bronze or cast iron.
 2. Internal Parts: Nonferrous.
 3. Operator: Noncorrosive metal float.
 4. Inlet Connection: NPS 1/2.
 5. Discharge Connection: NPS 1/4.
 6. CWP Rating: 150 psig.
 7. Maximum Operating Temperature: 240 deg. F.
- D. Expansion Tanks/Diaphragm Bladder-:
 1. Tank: Welded steel, rated for 125-psig working pressure and 240 deg. F. maximum operating temperature. Factory test with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 2. Diaphragm/Bladder: Heavy duty Butyl Rubber, securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
- E. In-Line Air Separators:
 1. Tank: One-piece cast iron with an integral weir constructed to decelerate system flow to maximize air separation.
 2. Maximum Working Pressure: Up to 175 psig.
 3. Maximum Operating Temperature: Up to 300 deg. F.

F. Air Purgers:

1. Body: Cast iron with internal baffles that slow the water velocity to separate the air from solution and divert it to the vent for quick removal.
2. Maximum Working Pressure: 150 psig.
3. Maximum Operating Temperature: 250 deg. F.

2.12 WATER TREATMENT

- A. HVAC Water-Treatment Service Provider Qualifications: Secure the services of an experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as required and specified. The provider shall have a minimum, of 5 years' experience with projects of a similar size and scope. Submit service provider's qualifications.
- B. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion, scale formation, and biological growth for chilled-water piping heating, hot-water piping and equipment. Services and chemicals shall be provided for a period of one year from the date of Substantial Completion, and shall include the following:
1. Initial water analysis and HVAC water-treatment recommendations.
 2. Startup assistance to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
 3. Periodic field service and consultation consisting of a minimum of one site visit per month.
 4. Provide reports indicating the type of treatment and date of the site visit.
 5. Analyses and reports of all chemical items concerning safety and compliance with government regulations.

2.13 CHEMICAL TREATMENT AND EQUIPMENT

- A. Bypass Chemical Filter Feeder: Provide bypass filter/feeders where shown on the drawings, manufactured by Neptune Chemical Pump Company or equal. The bypass feeder shell shall be constructed of 11 gauge steel minimum for 2 gallon units and 10 gauge steel minimum for 5 gallon and larger units. Tank heads shall be a minimum of 11 gauge steel for 2 gallon units and a minimum 9 gauge steel for 5 gallon units. The bypass feeder shall be rated at 300 psi and to 200 degrees F. The tank shall have a wide mouth, 3-1/2" opening so that chemical addition can be performed without the need of a funnel. The bypass feeder shall have a continuous threaded closure requiring 2-1/2 turns to close and seal. Closures using partial threads or lugs shall not be considered. Closures rated less than 300 psi shall not be considered equal. The cap shall be constructed of cast iron with an epoxy-coated underside to prevent corrosion and shall use a square ring gasket seal. The ring gasket shall not be glued or restrained from movement. Closures using "o" rings or gaskets which are glued or restrained from free movement by snap rings shall not be considered equal. The bypass feeder shall be provided with legs to elevate the feeder off the floor. The legs shall have holes to allow mounting by anchor bolts. The bypass feeder shall be provided with a 5 micron cartridge filter for simultaneous side stream filtering.
- B. Chemicals: Provide specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.

2.14 HYDRONIC PIPING SPECIALTIES

- A. Y-Pattern Strainers: Subject to compliance with requirements, provide products by Metraflex, Hoffman Specialty, Armstrong or equal:
1. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
 2. End Connections: Threaded or sweat for NPS 2 and smaller; grooved or flanged for NPS 2-1/2 and larger.
 3. Strainer Screen: perforated stainless steel with 50 percent total free area.
 4. CWP Rating: 150 psig.
- B. Stainless-Steel Bellow, Flexible Connectors:
1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
 2. End Connections: Threaded or flanged to match equipment connected.
 3. Performance: Capable of 3/4-inch misalignment.
 4. CWP Rating: 150 psig.
 5. Maximum Operating Temperature: 250 deg. F.
 6. Three Victaulic Style 77 couplings may be used in lieu of a flexible for vibration attenuation and stress relief at equipment connections. The couplings shall be in close proximity to the vibration source.
- C. Spherical, Rubber, Flexible Connectors:
1. Body: Fiber-reinforced rubber body.
 2. End Connections: Steel flanges drilled to align with Classes 150 and 300 steel flanges.
 3. Performance: Capable of misalignment.
 4. CWP Rating: 150 psig.
 5. Maximum Operating Temperature: 250 deg. F.

2.15 ALIGNMENT GUIDES AND ANCHORS

- A. Alignment Guides: Where required provide alignment guides manufactured by Metraflex Inc or equal. Guides to be factory-fabricated alignment guides suitable for installation with insulated piping where applicable.
- B. Anchors: Provide factory fabricated anchors manufactured by Metraflex or equal. In lieu of factory fabricated anchors provide field fabricated anchors fabricated from ASTM A36 / A36M steel shapes and plates.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Hot-water heating system piping, aboveground, NPS 2 and smaller, shall be one of the following:
1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
 2. Schedule 40 steel pipe; Class 125, cast-iron fittings; cast-iron flanges and flange fittings; and threaded joints.
 3. Pressure seal piping systems.
 4. Mechanically formed extruded outlets.

5. PEX-a systems

Note: PEX can not be used inside the boiler room. PEX can be used as an option outside the boiler room.

B. Makeup-water piping installed aboveground shall be:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

C. Condensate-Drain Piping:

1. Schedule 40 PVC plastic pipe and fittings and solvent-welded joints.
2. Install condensate drain piping at a minimum slope of 1% in the direction of flow.

D. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.

E. Air-Vent Piping:

1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.
2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

F. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.

3.2 VALVE APPLICATIONS

A. Install shut off-duty valves at each branch connection to supply mains, and at supply and return connection to each piece of terminal equipment and at other locations indicated on the drawings. All valves are to be installed in an accessible location.

B. Install calibrated balancing valves in the return pipe of each heating or cooling terminal and elsewhere as shown on the drawings. Valves are to be installed with the test ports facing 40 degrees to vertical above the centerline of the pipe.

C. Install check valves at each pump discharge and elsewhere as required to control flow direction.

D. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to the outdoors; and pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

E. Where indicated, install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

F. Isolation valves for each boiler are to be labeled with warnings required by the PA Department of Labor and Industry. Verify requirement before installation begins.

3.3 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general routing, location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings. Provide offsets where required to clear steel, electrical conduit and / or other construction components.
- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping 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 fittings for changes in direction and branch connections. Install piping to allow application of insulation.
- G. Select system components with pressure rating equal to or greater than system operating pressure.
- H. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- I. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- J. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- K. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- L. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- M. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.
- N. Install unions or flanges at the inlet and outlet of all control valves.
- O. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple, ball valve and hose connection in blowdown connection of strainers. Match size of strainer blow-off connection for strainers smaller than NPS 2.
- P. Identify piping as specified in Division 23 Section "Identification for HVAC Piping and Equipment."
- Q. Provide Firestopping at all rated partitions. Provide a caulked and sealed installation at all non-rated partitions.

- R. Provide expansion compensator joints or expansion loops for copper, steel and / or PEX—a piping where indicated on the drawings. Provide the quantity of pipe anchors and alignment guides as required by the expansion compensator manufacturer. Install expansion joints, guides and anchors per the manufacturer's installation requirements. Install anchors at locations indicated and per the following:
1. To Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 2. To Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.
 3. For PEX-a piping provide anchors as required by the pipe manufacturer's installation requirements.

3.4 HANGERS AND SUPPORTS

- A. Support all HVAC system piping to conform to ASME B31.9. Provide adjustable clevis hangers for all horizontal piping. Each hanger shall allow for adjustment, after installation, while supporting the pipe. Attach hangers to structural steel in accordance with MSS SP-69 and MSS SP-89. Install piping hangers and supports to provide the indicated pipe slopes.
- B. Provide miscellaneous structural steel for support of HVAC equipment and piping. In areas with exposed construction, install miscellaneous supports prior to painting of ceiling and walls.
- C. Provide a 12" long 18 gage protective saddle for all clevis hangers that support insulated piping.
- D. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- E. Use stainless-steel pipe hangers or fiberglass pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Install hangers for steel piping with the following maximum spacing:
1. NPS 3/4 to NPS 2: 8 feet maximum horizontal spacing.
 2. NPS 2 and larger: 12 feet maximum horizontal spacing.
 3. Vertical supports at roof, at each floor, and at 10 foot maximum intervals.
- H. Install hangers for drawn-temper copper tubing with the following maximum spacing:
1. NPS 1-1/4 and smaller: 6 feet maximum horizontal spacing.
 2. NPS 1-1/2 and larger: 10 feet maximum horizontal spacing.
 3. Vertical supports at roof, at each floor, and at 10-foot maximum intervals.
- I. Install hangers for PEX-a with the following maximum spacing:
1. All sizes: 32 inches maximum horizontal spacing.
 2. Vertical supports at roof, at each floor, and at 10-foot maximum intervals.

3.5 PIPE JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements.
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
 4. 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:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - b. 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.
- B. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- C. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts in accordance with the manufacturer's written instructions. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings of the same manufacturer.
1. The grooved couplings factory trained representative shall provide on-site training for the contractor's field personnel in the use of grooving tools and the installation of grooved joints.
 2. The representative shall visit the job site periodically to review the installation and verify the system is being installed per the manufacturer's recommendations.
 3. A direct employee of the grooved piping system manufacturer must conduct the training and site visits. A distributor representative is not acceptable.

3.6 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at all high points in all piping systems, at heat-transfer coils, where required for system air venting and at locations indicated on the drawings.
- B. Install automatic air vents at high points of system piping in mechanical equipment rooms only.
- C. Install piping from boiler air outlet, air separator, or air purger to expansion tank with a 2 percent upward slope toward tank.
- D. Where indicated install air separators in pump suction. Install drain valve on air separators NPS 2 and larger.
- E. Install bypass chemical filter/feeders in each hydronic system where indicated, in upright position with top of unit more than 48 inches above the floor. Install feeder with bypass line, full-size ball valve and balancing valve. Install NPS 3/4 pipe from chemical feeder drain, to nearest equipment drain and include a ball valve. Verify installation details with the manufacturer to verify inlet and outlet connection locations.
- F. Install expansion tanks on the floor or properly suspended from the structure. Vent and purge air from hydronic system, and ensure tank is properly charged with air to suit system project requirements. Provide ASME relief valves and pressure gauges on all expansion tanks per PA Labor and Industry requirements. Connect piping from the system to the expansion tank and the side of the pipe main, not the top or bottom of the main.

G. BACKFLOW PREVENTERS:

1. Install Reduced-Pressure-Principal-Backflow-Preventers (noted as RPB on the drawings) in each water supply to HVAC equipment and systems.
2. In addition to installing the RPB, install Backflow Preventers (noted as BP on the drawings) in each water fill connection for boiler fill systems.
3. Install drain for all 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 not acceptable for this application.
4. Do not install bypass piping around backflow preventers. Locate backflow preventers in same room as connected equipment or system. Do not install bypass piping around backflow preventers.

3.7 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections. Install control valves in accessible locations close to connected equipment.
- B. Provide shut-off valves on the supply and return connections to all terminal equipment. Where indicated, install bypass piping with ball or butterfly valve around control valve.
- C. Connections to any control valve, shut-off valve, strainer, balancing devices or other similar devices with bronze construction shall be made with an adapter fitting and/or nipple made of the same material.

3.8 CHEMICAL TREATMENT

- A. For the initial system fill perform an analysis of makeup water to determine type and quantities of chemical treatment needed to keep the chilled water and heating hot water system free of scale, corrosion, and fouling, and to sustain the proper water characteristics. Sample water at one-week intervals after equipment startup for a period of six weeks, and prepare test report. Sample water at four-week intervals following the testing noted above to show that automatic chemical-feed systems are maintaining water quality within performance requirements.
- B. At four-week intervals following Substantial Completion, perform separate water analyses on all hydronic systems to show that automatic chemical-feed systems are maintaining water quality within performance requirements.
- C. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.
- D. Prior to start-up of any HVAC equipment, provide the required type of water treatment for all closed loop and open systems including but not limited to
 1. Closed loop heating system.
- E. Provide initial chemical treatment of all systems and maintain the required water quality within the proper ranges for a period of one year after the date of substantial completion. If the project has multiple construction phases, the date of substantial completion for the final phase of construction shall be used to begin the time period for water treatment.

3.9 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
1. Leave joints, including welds, uninsulated and exposed for examination during test.
 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 3. Flush hydronic piping systems with clean water; then remove and clean or replace all strainer screens. If the project has multiple construction phases provide the necessary labor and materials for flushing and cleaning of the hydronic system for each phase.
 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
 3. Isolate expansion tanks and determine that hydronic system is full of water.
 4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
 5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
 6. Prepare written report of testing.
- C. Perform the following before operating the system:
1. Open manual valves fully.
 2. Inspect pumps for proper rotation.
 3. Set makeup pressure-reducing valves for required system pressure.
 4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
 5. Set temperature controls so all coils are calling for full flow.
 6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
 7. Verify lubrication of motors and bearings.

END OF SECTION 23 21 10

SECTION 23 21 30 - HYDRONIC PUMPS

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. This Section includes in-line centrifugal pumps, base mounted pumps and accessories.

1.3 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
- B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain all hydronic pumps through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of hydronic pumps and are based on the specific system indicated.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
- B. Store pumps in dry location.

- C. Retain protective covers for flanges and protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with pump manufacturer's written rigging instructions.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Mechanical Seals: One set mechanical seal(s) for each pump.

PART 2 - PRODUCTS

2.1 CLOSE-COUPLED, IN-LINE CENTRIFUGAL PUMPS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 1. Armstrong Pumps Inc.
 - 2. Aurora Pump; Division of Pentair Pump Group.
 - 3. Bell & Gossett; Div. of ITT Industries.
 - 4. Patterson Pumps.
 - 5. Taco, Inc.
- B. Description: Factory assembled and tested, centrifugal, close-coupled, in-line pump designed for installation with pump and motor shafts mounted horizontally or vertically. Rate pump for 175-psig (1204-kPa) working pressure and a continuous water temperature of 225 deg F (107 deg C). Each pump shall be thoroughly cleaned and painted with at least one coat of high grade machinery enamel prior to shipment.
- C. Pump Construction: Pump volute shall be Class 30 cast iron and shall be hydrostatically tested to 150% maximum working pressure. The casing shall be radially split to allow removal of the rotating element without disturbing the pipe connections. The impeller shall be ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance. The liquid cavity shall be sealed off at the motor shaft by an internal mechanical seal with ceramic seal seat and carbon seal ring, suitable for continuous operation at 225 degrees F.
- D. Motors to meet NEMA specifications and shall be the size and voltage as indicated on the drawings. The motor shall have heavy duty grease lubricated bearings designed for the maximum load required by the motor.

2.3 PUMP SPECIALTY FITTINGS

- A. Triple-Duty Valve: Angle or straight pattern, 175-psig pressure rating, cast-iron body, pump-discharge fitting; with drain plug and bronze-fitted shutoff, balancing, and check valve features. Brass gage ports with integral check valve, and orifice for flow measurement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.
- C. Examine foundations and inertia bases for suitable conditions where pumps are to be installed.

3.2 PUMP INSTALLATION

- A. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.
- B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
- C. Install continuous-thread hanger rods and of sufficient size to support pump weight.
- D. Suspend vertically mounted, in-line centrifugal pumps independent of piping. Install pumps with motor and pump shafts vertical. Use continuous-thread hanger rods and vibration isolators of sufficient size to support pump weight.

3.3 ALIGNMENT

- A. Align pump and motor shafts and piping connections after setting on foundation, grout has been set and foundation bolts have been tightened, and piping connections have been made.
- B. Comply with pump and coupling manufacturers' written instructions.
- C. Adjust pump and motor shafts for angular and offset alignment.

3.4 CONNECTIONS

- A. Install piping adjacent to pumps to allow service and maintenance clearance.
- B. Connect piping to pumps providing all required fittings. Install valves and other accessories that are same size as piping connected to pumps.
- C. Install check valve and throttling valve or triple-duty valve on discharge side of pumps.

- D. Install Y-type strainer or suction diffuser on suction side of all pumps. Install a shutoff valve on suction side of pumps.
- E. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.
- F. Install pressure gages on pump suction and discharge, at integral pressure-gage tapping, or install single gage with multiple input selector valve.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Check piping connections for tightness.
 - 3. Clean strainers on suction piping.
 - 4. Perform the following startup checks for each pump before starting:
 - a. Verify bearing lubrication.
 - b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
 - c. Verify that pump is rotating in the correct direction.
 - 5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
 - 6. Start motor.
 - 7. Open discharge valve slowly.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps.

END OF SECTION 23 21 30

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes refrigerant piping used for HVAC applications.

1.3 SUBMITTALS

- A. Submit on pipe materials and fittings.

1.4 QUALITY ASSURANCE

- A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."
- C. VRF manufactures guidelines.

1.5 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.6 COORDINATION

- A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Brazing Filler Metals: AWS A5.8.

E. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch long assembly.
4. Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

F. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 240 deg F.

G. Permanent Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
3. Desiccant Media: Activated charcoal.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 2 psig.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 240 deg F.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT

- A. Suction Lines NPS 4 and Smaller for Conventional Air-Conditioning Applications: Copper tube and wrought-copper fittings with brazed joints.

3.2 PIPING INSTALLATION

- A. Install piping per the VRF system manufactures recommendations.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- K. Install refrigerant piping in protective conduit where installed belowground.
- L. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- M. Install pipe sleeves at penetrations in exterior walls and floor assemblies.
- N. Seal penetrations through fire and smoke barriers.
- O. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- P. Install sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
- Q. Seal pipe penetrations through exterior walls.
- R. Identify refrigerant piping and valves according to Division 15 Section "Mechanical Identification."

3.3 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

3.4 HANGERS AND SUPPORTS

- A. Install the following pipe attachments:
 - 1. Adjustable clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
 - 2. Copper-clad clevis hangers and supports for hangers and supports in direct contact with copper pipe.

- B. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 - 3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
 - 4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.

- C. Support multi-floor vertical runs at least at each floor.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections per the VFD system manufactures recommendations. Prepare test reports and submit to the engineer for review.

END OF SECTION 23 23 00

SECTION 23 31 10 - 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 metal ducts and accessories for various types of air distribution systems.

1.3 SUBMITTALS

- A. Shop Drawings: Provide ductwork shop drawings to indicate the dimensioned locations and elevations of all ducts and duct accessories.
- B. Product data for each of the following products:
 - 1. Duct sealants.

1.4 PERFORMANCE REQUIREMENTS

- A. 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 as indicated in Part 3 of this specification.
- B. Refer to the contract drawings for any notes that indicate requirements for duct construction that may differ from the SMACNA standard requirements. Where indicated provide duct construction that meets requirements.

1.5 QUALITY ASSURANCE

- A. Comply with the requirements of NFPA 90A and 90B.
- B. The installation of all ductwork shall comply with the requirements of the 2015 International Mechanical Code and all applicable local codes and code amendments.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect all ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent dirt and moisture from entering ducts and duct fittings. Store ductwork in an area which is protected from the weather. All ductwork shall be shipped with a protective polyethylene film or other water tight covering at the ends of all ducts and fittings. While ducts are stored on-site the protective covering shall remain in place.

PART 2 - PRODUCTS

2.1 SINGLE WALL RECTANGULAR DUCTS AND FITTINGS

- A. Refer to and comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Rectangular Duct Construction," for fabrication of ducts based on the static-pressure class indicated in Part 3 of this specification.
- B. Fabricate ducts with a gage thickness per the requirements of Chapter 2.
- C. Longitudinal Seam, Traverse Joints and Reinforcements: Select and fabricate seam, joint, reinforcement types and sealing requirements and according to the requirements in Chapter 2 for required static-pressure class, applicable sealing requirements, duct-support intervals, and other provisions in the SMACNA Standard."
- D. Duct fittings: fabricate elbows, turning vanes, branch connectors, offsets and transitions in accordance with Chapter 4 of the SMACNA "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Radius elbows: type RE 1 with a center line radius equal to 1.5 times the duct width.
 - 2. Square throat elbows: type RE 2 with turning vanes per figure 4-3 and 4.4.
 - 3. Branch connections: 45 degree entry.

2.2 SINGLE WALL ROUND 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.
- B. Fabricate ducts with a gage thickness per the requirements of Chapter 3.
- C. Longitudinal Seam, Traverse Joints and Reinforcements: Select seam, joint, reinforcement types and sealing requirements and fabricate according to the requirements in Chapter 3 for required static-pressure class, applicable sealing requirements, duct-support intervals, and other provisions in the SMACNA Standard."
- D. Duct fittings: fabricate elbows and tees in accordance with Chapter 3.
 - 1. Elbows: fabricate with a center line radius equal to 1.5 times the duct diameter.
 - 2. Tees and laterals: fabricate per figure 3-5

2.3 SPIRAL SEAM 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.
- 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) of the inner duct.
- C. Fabricate ducts with a gage thickness per the requirements of Chapter 3.

- D. Longitudinal Seam shall be a spiral lock seam per figure 3-2
- E. Traverse Joints and Reinforcements: Select seam, joint, reinforcement types and sealing requirements and fabricate according to the requirements in Chapter 3 for required static-pressure class, applicable sealing requirements, duct-support intervals, and other provisions in the SMACNA Standard."
- F. Duct fittings: fabricate elbows and tees in accordance with Chapter 3.
 - 1. Elbows: fabricate with a center line radius equal to 1.5 times the duct diameter.
 - 2. Conical tees and laterals: fabricate per figure 3-6.
- G. Provide spiral duct and fittings with a PVC coating where indicated on the drawings. PVC coating to be 4 mils thick and applied to the interior and exterior of the ducts and fittings.

2.4 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60 for interior ductwork conveying non-hazardous materials; G90 for interior ductwork conveying hazardous materials; G90 for exterior ducts without exterior insulation.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized and suitable for painting.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- 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.

2.5 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. CertainTeed Corporation.
 - b. Johns Manville.
 - c. Knauf Insulation.
 - d. Owens Corning.

2. Materials: ASTM C 1071; surfaces exposed to airstream shall have a factory applied coating to prevent erosion of glass fibers and a factory applied coating on the edge of the liner.
 - a. Thickness: 1 inch or as noted on the drawings.
 - b. Density: 2.0 pcf.
 - c. Thermal performance: "R" equals 4.2 for 1" thick.
 - d. Sound Absorption Coefficient (NRC): 0.70 for 1" thick; 0.80 for 1.5" thick; 0.85 for 2" thick.
 - e. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - f. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - f. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

B. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," and manufacturer's instructions.

1. Where lined ducts are indicated, the duct dimensions indicated on the drawings are the metal size. The net free area size of the duct is the metal size minus the liner thickness.
2. Adhere to a single layer of liner with adhesive coverage per the manufacturer's recommendations.
3. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
4. Butt transverse joints without gaps, and coat joint with adhesive.
5. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
6. Secure liner with mechanical fasteners per SMACNA standards and the manufacturer's recommendations.
7. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
8. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.6 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. Water-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.

4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. 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, use sealant that has 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. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive or negative.
11. Service: Indoor or outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. 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, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.7 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," "Rectangular Duct Hangers Minimum Size," - "Minimum Hanger Sizes for Round Duct."
- D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. 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. Fabricate, install and support ductwork and accessories according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- B. The installing contractor is required to field verify all duct locations and elevations prior to fabrication of the ductwork.
- C. 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.
- D. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures. Do not locate ducts over electrical panels.
- E. Install round and flat-oval ducts in maximum practical lengths.
- F. Install ducts with fewest possible joints. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- G. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- I. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- J. Where ducts pass through non-fire-rated interior masonry or drywall partitions and any type of exterior wall(s), 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. Paint interiors of metal ducts that do not have duct liner for 24 inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer.

- L. Refer to contract drawings for locations where sprinklers are to be located within various duct systems. Coordinate locations with the sprinkler installer. Refer to contract drawing details for work required for a complete duct installation.

3.2 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."

3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports and the requirements of the International Mechanical Code Section 603. Support spacing of all hangers shall be per SMACNA standards but in no case shall hangers be spaced at more than 10'-0" intervals.
- B. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," "Rectangular Duct Hangers Minimum Size," and "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.
- C. 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.
- D. 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.
- E. Cable Support Systems: Where ducts are exposed to view in finished areas provide cable duct support systems installed per the manufacture's installation instructions.

3.4 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.
- C. Dust collector ducts: Minimum 20 gage G90 coated galvanized spiral duct and fittings with sealed joints.

3.5 DUCT SCHEDULE

- A. Fabricate ducts with G90 galvanized sheet steel.

- B. Supply Ducts:
 - a. Pressure class: positive 1-inch wg.
 - b. Minimum SMACNA seal class: B.

- C. Exhaust Ducts:
 - 1. Pressure Class: Positive or negative 1-inch wg.
 - a. Minimum SMACNA seal class: B if negative pressure, and B if positive pressure.

- D. Outdoor-Air:
 - 1. Pressure Class: positive or negative 1-inch wg.
 - a. Minimum SMACNA Seal Class: B.

END OF SECTION 23 31 10

SECTION 23 33 00 - DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes various duct accessories such as fire dampers, volume dampers and other items that are typically part of a duct system.

1.3 SUBMITTALS

- A. Submit Product Data for all accessories provided on the project.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Where indicated in Part 2, provide products manufactured by the listed companies.

2.2 SHEET METAL 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.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 or G90 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

2.3 MANUAL BALANCING DAMPERS

- A. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- B. Standard Balancing Dampers: Multiple or single-blade, with opposed blade design, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications. Provide single blade dampers where the duct dimension is 10 inches or less in height. Provide dampers with multiple blade design in larger ducts.
 1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; provide frames with flanges where required for attaching to walls and flangeless frames where indicated for installing in ducts.
 2. Roll-Formed Steel Blades: 0.064-inch thick, galvanized sheet steel.
 3. Blade Axles: Galvanized steel.
 4. Bearings: Molded synthetic.
 5. Tie Bars and Brackets: Galvanized steel.
- C. Jackshaft: 1-inch diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- D. Damper Hardware: 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. Include center hole to suit damper operating-rod size. Include factory supplied or field installed elevated platform for insulated duct mounting.

2.4 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes with the edge of the vanes parallel with the air flow.
- B. Manufactured Turning Vanes: Fabricate 1-1/2-inch wide, double vane, curved blades of galvanized sheet steel; support with bars perpendicular to blades set 2 inches and set into vane runners suitable for duct mounting.
- C. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill and install where noted on the drawings.

2.5 DUCT MOUNTED ACCESS DOORS

- A. General Description: Fabricate doors airtight and suitable for duct pressure class.
- B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include 1-by-1-inch butt or piano hinge and cam latches.
 1. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 2. Provide number of hinges and locks as follows:
 - a. Less Than 12 Inches Square: Secure with two sash locks.
 - b. Up to 18 Inches Square: Two hinges and two sash locks.

- c. Up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
 - d. Sizes 24 by 48 Inches and Larger: One additional hinge.
- C. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- D. Insulation: 1-inch thick, fibrous-glass or polystyrene-foam board.

2.6 FLEXIBLE CONNECTORS

- A. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- B. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 0.028-inch thick, galvanized sheet steel or 0.032-inch thick aluminum sheets. Select metal compatible with ducts.
- C. 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.
- D. 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.

2.7 FLEXIBLE DUCTS AND ACCESSORIES

- A. Manufacturers:
- 1. Thermaflex MK-E or equal.
- B. Insulated Flexible Duct: UL 181, Class 1, flexible air duct complying with NFPA Standards 90A and 90B. Flexible duct shall be factory made and composed of a resilient film liner duct liner permanently bonded to a coated spring steel wire helix and supporting a fiberglass insulating blanket. Provide with a low permeability outer vapor barrier of fiberglass reinforced film laminate insulation.
- C. Operating temperatures: -20 Deg. F. minimum; 250 deg. F. maximum.
- D. Operating pressure: 10" w.g. positive; 1" w.g. negative.
- E. Insulation: minimum R 6.0.
- F. Rated velocity 5000 fpm.
- G. Maximum flame spread = 25. Maximum smoke developed = 50.
- H. Flexible Duct Clamps: Nylon strap to suit duct size.

- I. Flexible duct supports: Provide flexible duct supports at all locations where flex ducts connect to ceiling diffusers. Supports to be Thermaflex FlexFlow or Flexmaater FlexRight.

2.8 DUCT ACCESSORY HARDWARE

- A. Instrument Test Ports: 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 the specified external duct insulation thickness. Provide special gaskets where test holes are to be installed in round or oval ducts. Test Ports to be Duro-Dyne model TH1, IP2 and/or IP4.
- 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.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- D. Install manual balancing dampers in ducts with liner utilizing an insulated "hat" section at the damper frame. Avoid damage to and erosion of duct liner. Where balancing dampers are located in ducts with exterior insulation, provide and insulated hat section to house the damper operator.
- E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
- F. Provide test holes at fan inlets and outlets and elsewhere as required.
- G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
 - 1. Adjacent to all fire, smoke dampers and/or combination fire/smoke dampers, providing access to reset or reinstall fusible links.
 - 2. To interior of ducts for cleaning at maximum 100-foot spacing between access doors.
- H. Install the following sizes for duct-mounting, rectangular access doors:
 - 1. Minimum size 12 x 12 inches.
 - 2. Ducts with one dimension 24" or larger, install a 20" x 20" access door.
- I. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

- J. Connect terminal units to supply ducts with flexible duct connectors.
- K. Where indicated on the drawings, connect diffusers to low pressure ducts with maximum 72 inch length of flexible duct clamped in place. Connect flexible ducts to metal ducts with draw bands. Provide duct support connectors at all flex elbow connections to diffusers.
- L. Install duct test holes where indicated and required for testing and balancing purposes. Coordinate location with testing, adjusting and balancing contractor.
- M. Provide turning vanes in all mitered elbows.

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.

END OF SECTION 23 33 00

SECTION 23 37 10 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes ceiling and wall mounted diffusers, registers, and grilles.

1.2 DEFINITIONS

- A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
- B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.
- C. Register: A combination grille and damper assembly over an air opening.

1.3 SUBMITTALS

- A. Submit manufacturer's technical product data for all air outlets. For each model indicated, include the following:
 - 1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
 - 2. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished. The schedule shall also indicate static-pressure drop, and noise criteria ratings (NC) for each air outlet and inlet. A generic catalog sheet indicating pressure drop and NC ratings is not acceptable.

1.4 QUALITY ASSURANCE

- A. Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems.
- B. Source Limitations: Obtain diffusers, grilles and registers through one source from a single manufacturer, regularly engaged in production of the equipment.

1.5 EXTRA MATERIALS

- A. Provide one additional filter for each filter grille/register furnished on the project. The extra filters will be given to the owner at the close of the project.

PART 2 - PRODUCTS

2.1 REGISTERS AND GRILLES

- A. General: Provide registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Provide opposed blade damper on all registers.
- B. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
- C. Structural Integrity: floor registers and grilles are required to meet the structural requirements indicated in the International Mechanical Code Chapter 6: 603.18.1.
- D. Compatibility: Provide registers and grilles with border styles indicated and that are compatible with adjacent wall or ceiling systems, and that are specifically manufactured to fit into construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of construction which will contain each type of register and grille.
- E. Types: The model numbers and manufacturers indicated on the drawing schedules set the standard for the product(s) to be provided. Provide registers and grilles of type as scheduled, with accessories as required to match the basis of design product named on the drawing.
- F. Provide each register and/or grille in manufacturer's standard white electro-coated finish. Refer to equipment schedules for grilles/registers that require a custom color. When required, the Architect will select the custom colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be 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 diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, 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 diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.4 CLEANING

- A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 23 37 10

SECTION 23 37 30 - LOUVERS AND VENTS

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 Stationary Louvers with Wind Driven Rain Certified Horizontal Blades.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on a uniform pressure of 30 lb / sq. ft., acting inward or outward.
- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 SUBMITTALS

- A. Product Data: For each type of product including manufacturer's data with appropriate AMCA Certified Ratings Seals.
- B. Provide shop drawings including plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- C. Provide samples for initial selection.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. Product must be licensed to bear the AMCA Certified Ratings Seal for Water, Air, and Wind Performance.
- C. Louvers shall be warranted against manufacturing defects for a period of 5 years.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 FIXED BLADE EXTRUDED-ALUMINUM LOUVERS

- A. Manufacturers: Provide Model ECD-635 Louvers manufactured by Pottorff. Subject to compliance with requirements products manufactured by one of the following may be considered:
 - 1. Air Balance Inc.
 - 2. American Warming and Ventilating, Inc.
 - 3. Dowco.
 - 4. Greenheck
 - 5. Louvers & Dampers, Inc.
 - 6. Metalaire.
 - 7. Nailor
 - 8. Ruskin Manufacturing.
- B. Construction:
 - 1. Material: Mill Finish 6063-T5 extruded aluminum.
 - 2. Frame: 6" deep x 0.081" thick channel.
 - 3. Blades: 35° x 0.081" (2) thick horizontal drainable chevron style.
 - 4. Screen: ½" x 0.063" (12.7 x 1.6) expanded and flattened aluminum mesh insect screen.
 - 5. Mullion: Visible.
- C. Performance Data: free area and pressure drop as indicated on the drawing schedules.
 - 1. Maximum Pressure Drop as indicated on the drawing schedules.
 - 2. Maximum Water Penetration: 0.01 ounces per square foot of free area at an air flow of 1,217 fpm free area velocity when tested for 15 minutes.

3. Minimum wind driven rain performance @ 8 in/hr rainfall rate and 50 mph wind speed based on testing 39.375 inch x 39.375 inch core area louver:
 - a. Core Velocity: 441 fpm (2.24m/s)
 - b. Effectiveness Ratio: 96.6%
 - c. Wind Class: B
 - d. Discharge Class: 2

- D. Design Load:
 1. Wind Load: Louver designs shall withstand the effects of 30 psf (1.44 kPa) of uniform pressure acting inward or outward.
 2. Seismic Performance: Louvers, including attachments to other construction, shall withstand seismic effects determined by ASCE-7.

- E. Louver(s) Finish:
 1. High Performance Fluoropolymer: Complying with AAMA 2605 and containing not less than 100 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 2. Color and Gloss: Provide louvers with finished color and gloss as selected by the Architect from manufacturer's full range.

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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Install louvers at locations as indicated on the drawings and in accordance with manufacturer's instructions. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass 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. 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.
- F. Protect unpainted galvanized and nonferrous-metal surfaces that will be 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.
- G. Install concealed gaskets, flashings and joint fillers as louver installation progresses. Provide a weathertight louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of louvers and vents 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 and vents 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. 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 23 37 30

SECTION 23 52 70 – HIGH EFFICIENCY GAS BOILERS

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. This Section includes packaged, factory-fabricated and assembled, gas-fired, sealed combustion, modulating, condensing hot water boilers. There is total of two floor mounted boilers for this project. Provide manufactures primary pump packages, piping manifolds and boiler sequence controller.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties and accessories. Prior to flue vent installation, provide engineered calculations and drawings to thoroughly demonstrate that size and configuration conform to recommended size, length and footprint for each submitted boiler.
- B. Efficiency Curves: At a minimum, submit efficiency curves for 100%, 80%, 60%, 40% 20%, and 7% input firing rates at incoming water temperatures ranging from 80°F to 160°F.
- C. Pressure Drop Curve: Submit pressure drop curve for flows ranging from 0 GPM to maximum value of boiler. If submitted material is different from that of the design basis, boiler manufacture shall in-cur all costs associated with reselection of necessary pumps.
- D. Shop Drawings: For boilers, boiler trim, and accessories. Provide wiring diagram for power, signal, and control wiring.
- E. Operation and Maintenance Data: For boilers to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
 - 1. The Terms “Listed” and “Labeled”: As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A “Nationally Recognized Testing Laboratory” as defined in OSHA Regulation 1910.7.
- B. ASME Compliance: Boilers shall bear ASME “H” stamp and be National Board listed.
- C. Comply with NFPA 70 for electrical components and installation.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail, in materials or workmanship, within specified warranty period.

- 1. Warranty Period for Fire-Tube Condensing Boilers:

- a. The pressure vessel/heat exchanger shall carry a 5 year from shipment, prorated, limited warranty against any failure due to condensate corrosion, thermal stress, mechanical defects or workmanship.
 - b. Manufacturer labeled control panels and other boiler components are to be warranted against failure for (1) year after the date of substantial completion of the final phase of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide boilers manufactured by Bosch International. Subject to review, boilers meeting the full requirements of the specifications and project installation limitations, manufactured by the following will be considered:

- 1. Viessmann Manufacturing.
 - 2. Weil Mclain

2.2 BOILER COMPONENTS

- A. Boilers shall be gas fired, condensing, sealed combustion, modulating boilers with AL-SI cast heat exchangers that use outside air for combustion.
- B. Boilers shall be Energy Star rated with a AFLU rating of 95% and shall meet the 2012 SCAQMD regulations for low NOx emissions.
- C. Boiler(s) shall be capable of full modulation firing with a 5 ton1 turn down.
- D. Boiler(s) shall be manufactured to conform to Section IV of the ASME boiler and pressure vessel code.
 - 1. Individual cast aluminum mono block to be fire tested and hydrostatically pressure tested at the factory in accordance with ASME regulations.
 - 2. Maximum available working pressure 30 PSIG water as listed on the rating label.
- E. Regulatory Requirements:

1. Boiler(s) shall meet or exceed SCAQD (South Coast Air Quality District of California) Low NO_x Emission requirement of 40NG/J.
2. Boilers shall meet the U.S. ERA and DOE guidelines for Energy Star efficiency (sizes under 300K BTUH input).

F. Boiler Construction:

1. Heat Exchanger shall be Aluminum – Magnesium construction.
2. Shall be furnished with a full modulating fan assembly which increases or decreases its speed based on the heat demand controlling the amount of gas coming to the boiler.
3. Boilers shall be equipped with a Heatronic controller which manages the boiler and other available accessories plus allows for diagnostic testing and fault code messages.
4. The burner shall be stainless steel premix combustion type.
5. The boilers shall be equipped a primary pump.
6. The boilers shall be equipped with a variable speed blower system capable of modulating the boiler firing rate.
7. The control system shall have an electronic display for boiler set-up, boiler status and boiler diagnostics.
8. Boilers shall have an integrated low loss header with a preinstalled supply sensor to assure proper hydraulic separation between the boiler and hydronic distribution.
9. Lead/Lag Control: Bosch Model ICM, or equal. Cascade controller shall be capable of sequencing up to 4 boilers, able to accept 0-10vdc setpoint signal, transmit alarm conditions and monitor system supply temperature via resistance sensor input. Sequencing of each boiler shall be accomplished in a serial method; lead/lag rotation shall be completed every 100 operating hours for equal boiler runtime. Controller shall start and stop the primary and secondary pumps. Boiler manufacturer must provide common pipe temperature sensor to be mounted the common supply piping. The boiler manufacture shall provide an outdoor air temperature sensor which will be used to initiate boiler start and disable boiler operation based on an outdoor air temperature setting, (adjustable). The control system must accommodate alarm notification to the BAS.

G. Venting and Combustion Air

1. Boilers shall be capable of using outdoor air piped directly for combustion. Inlet and termination of these pipes must be either through the roof or sidewall as recommended by the manufacturer.
2. Flue and vent material shall be schedule 80 CPVC.

2.3 BOILER TRIM

- A. Pump Group Assembly: Grundfos circulator, integral flow check valve, supply and return shut-off valves, pressure gauge, 30psig relief valve, and gas supply shut-off valve; all components to be factory assembled. One pump group is supplied for each boiler.
- B. Temperature limiter, primary sensor and flue gas temperature limiter.
- C. ASME relief Valve, 30 PSIG.
- D. LLH/ Supply temperature sensor.
- E. Automatic ignition.
- F. Frost protection.

- G. High Limit: Temperature control with manual reset limits boiler water temperature in series with the operating control. High limit shall be field mounted and sense the outlet temperature of the boiler through a dry well.
- H. Auxiliary low water cut off.
- I. Manufacture to provide condensate neutralization kit.
- J. BAS interface for boiler status, and alarm notification.

2.4 MOTORS

- A. Refer to Division 23 Section "Motors" for factory installed motors.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect boilers according to the ASME Boiler and Pressure Vessel Code, Section IV. Boilers shall be test fired in the factory with a report attached permanently to the exterior cabinet of the boiler for field reference.

PART 3 - EXECUTION

3.1 BOILER INSTALLATION

- A. The installing Contractor is required to complete the PA Department of Labor and Industry form LIBI-302, "Intent to Install Boiler." When submitting the form, the installing contractor shall include all required fees and provide the owner with (3) copies of the submitted forms. The forms are available at the L and I website.
- B. Provide emergency Shut-off switches at each exit from the Boiler Room per the requirements of the PA Department of Labor and Industry.
- C. Equipment Mounting: Install boilers on cast-in-place concrete equipment base. Coordinate sizes and locations of concrete bases with actual equipment provided. Construct concrete bases 6 inches high and extend base not less than 6 inches in all directions beyond the maximum dimensions of boiler. 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.
- D. Install gas-fired boilers according to NFPA 54.
- E. Assemble and install boiler trim. Install electrical devices furnished with boiler but not specified to be factory mounted. Install control wiring to field-mounted electrical devices.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to boiler to allow service and maintenance.

- B. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- C. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service.
- D. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide gas-train venting per FM or IRI recommendations depending on the Gas Train specified in Part 2.
- E. Connect hot-water piping to supply- and return-boiler tapings with shutoff valve and union or flange at each connection.
- F. Install piping from safety relief valves to nearest floor drain.
- G. Boiler Venting: Provide all required venting as indicated on the drawings. Vent material shall be schedule 40 CPVC, solvent welded.
- H. Provide condensate neutralization kit and pipe to the nearest floor drain.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports. Engage the services of a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
 - b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions.
- E. Performance Tests:
 - 1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
 - 2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
 - 3. Perform field performance tests to determine capacity and efficiency of boilers.
 - 4. Repeat tests until results comply with requirements indicated.

5. Provide analysis equipment required to determine performance.
6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
7. Notify Engineer in advance of test dates.
8. Document test results in a report and submit to Engineer.

3.4 DEMONSTRATION

- A. Engage the services of a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION 23 52 70

SECTION 23 80 20 – VARIABLE REFRIGERANT FLOW 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 packaged variable flow refrigerant system components including but not limited to Indoor Evaporators, Branch Selector Boxes, Exterior Condensing Units, and Controls.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Provide wiring Diagrams: For power, signal, and control wiring. Provide detailed refrigerant piping drawings, indicating all sizes and specialties.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Provide operation and maintenance Data.
- E. Refrigerant piping methods and sizing may differ between manufactures. The contractor must include in the bid all refrigerant sizes and specialties that are required by the system that is used. Shop drawings will not be approved without a detailed refrigerant piping diagram.
- F. The electrical draw and characteristics of the equipment must meet the basis of design equipment. If the submittal of any equipment exceeds the basis of design. The submittal will be rejected.
- G. Submit HVAC system commissioning plan to engineer as described in part 3 of these specifications.

1.4 QUALITY ASSURANCE

- A. The units shall be listed by Electrical Laboratories (ETL) and bear the ETL label.
- B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
- C. The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

- D. The condensing unit shall be pre-charged with R410A refrigerant sufficient for the outdoor unit, indoor units and 164' of total extended piping length.
- E. Source Limitations: Obtain all units and accessories through one source from a single manufacturer, regularly engaged in production of the units.

1.5 WARRANTY

- A. All components of the VRF shall be fully warranted for a period of 1 year from the data of substantial completion.
- B. Compressors shall be warranted for a period of 10 years from the date of substantial completion. Warranty is exclusive of labor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Description: The variable capacity, systems shall be a Daikin Variable Refrigerant Flow Zoning System. The system shall consist of outdoor units, multiple indoor units, and Direct Digital Controls.
- B. Subject to compliance with requirements, the base bid shall be to provide a Variable flow refrigerant system by Daikin.
- C. Alternate bids for equipment meeting the requirements of the specifications:
 - 1. Alternate Bid H1 - Mitsubishi/Trane
 - 2. Alternate Bid H2 – Hatachi/JCI

2.2 VRF SYSTEM DESCRIPTION

- A. The VRF variable capacity heat recovery air conditioning system shall consist of multiple evaporators, branch selector boxes, REFNET™ joints and headers, a three-pipe refrigeration distribution system using PID control. The condenser shall be a direct expansion (DX), air-cooled heat recovery, multi-zone air-conditioning system with variable speed inverter driven compressors using R-410A refrigerant. The condensing unit may connect an indoor evaporator capacity up to 200% of the condensing unit nominal capacity. All zones are each capable of operating separately with individual temperature control. A dedicated hot gas pipe shall be required to ensure optimum heating operation performance. The condensing unit shall be interconnected to indoor unit models and shall range in capacity. The indoor units shall be connected to the condensing unit utilizing Daikin's REFNET™ specified piping joints and headers to ensure correct refrigerant flow and balancing. T style joints are not acceptable for a variable refrigerant system. Operation of the system shall permit either individual cooling or heating of each indoor unit simultaneously or all of the indoor units associated with each branch of the cool/heat selector box. Each indoor unit or group of indoor units shall be able to provide set temperature independently via a local remote controller, an Intelligent Controller, an Intelligent Manager or a BMS interface.

- B. Branch selector boxes: Branch selector boxes: The branch selector boxes shall have the capacity to control up to 290 MBH (cooling) downstream of the branch selector box. Each branch of the branch selector box shall consist of three electronic expansion valves, refrigerant control piping and electronics to facilitate communications between the box and main processor and between the box and indoor units. The branch selector box shall control the operational mode of the subordinate indoor units. The use of three EEV's ensures continuous heating during defrost (multiple condenser systems), no heating impact during changeover and reduced sound levels. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise.
- C. Refrigerant Piping: The system shall be capable of refrigerant piping up to 540ft actual or 623ft equivalent from the condensing unit to the furthest indoor unit, a total combined liquid line length of 3,280ft of piping between the condensing and indoor units with 295ft maximum vertical difference, without any oil traps or additional components. Piping joints and headers shall be used to ensure proper refrigerant balance and flow for optimum system capacity and performance. T style joints shall not be acceptable as this will negatively impact proper refrigerant balance and flow for optimum system capacity and performance.
- D. VRF System Wiring: The control voltage between the indoor and condensing unit shall be 16VDC non-shielded, stranded 2 conductor cable. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one 2-cable wire, thus simplifying the wiring installation. The control wiring maximum lengths shall conform to the manufacture's recommendations.

2.3 OUTDOOR/CONDENSING UNIT

A. GENERAL

1. The condensing unit is designed specifically for use with VRV series components.
2. The condensing unit shall be factory assembled in the USA and pre-wired with all necessary electronic and refrigerant controls.
3. The refrigeration circuit of the condensing unit shall consist of Daikin inverter scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports, liquid receiver and suction accumulator.
4. High/Low pressure gas line, liquid and suction lines must be individually insulated between the condensing and indoor units.
5. The condensing unit can be wired and piped with access from the left, right, rear or bottom.
6. The connection ratio of indoor units to condensing unit shall be permitted up to 200% of nominal capacity.
7. Each condensing system shall be able to support the connection of up to 64 indoor units dependent on the model of the condensing unit.
8. The sound pressure level standard shall be that value as listed in the Daikin engineering manual for the specified models at 3 feet from the front of the unit. The condensing unit shall be capable of operating automatically at further reduced noise during night time or via an external input.
9. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
10. The condensing unit shall be modular in design and should allow for side-by-side installation.
11. The following safety devices shall be included on the condensing unit; high pressure sensor and switch, low pressure sensor, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.

12. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
13. Oil recovery cycle shall be automatic occurring 2 hours after start of operation and then every 8 hours of operation. Each system shall maintain continuous heating during oil return operation.
14. The condensing unit shall be capable of heating operation at -13°F (-25°C) wet bulb ambient temperature without additional low ambient controls or an auxiliary heat source.
15. The multiple condenser VRV systems shall continue to provide heat to the indoor units in heating operation while in the defrost mode.

B. UNIT CABINET

1. The condensing unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed galvanized steel panels coated with a baked enamel finish.

C. FAN

1. The condensing unit shall consist of one or more propeller type, direct-drive 800W fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
2. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure and shall be factory set as standard at 0.12 in. WG. A field setting switch to a maximum 0.32 in. WG pressure is available to accommodate field applied duct for indoor mounting of condensing units.
3. The condensing unit shall have configurable settings for intermittent fan operation to help minimize snow accumulation on fan blades when the system is off.
4. The fan shall be a vertical discharge configuration with a nominal airflow maximum range of 7,283 CFM to 28,440 CFM dependent on model specified.
5. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
6. The fan motor shall be provided with a fan guard to prevent contact with moving parts.

D. SOUND

1. Nominal sound pressure levels shall be as shown below.

MODEL NUMBER	SOUND PRESSURE LEVEL dB(A)
REYQ72XATJ*	58
REYQ96XATJ*	61
REYQ120XATJ*	61
REYQ144XATJ*	65
REYQ168XATJ*	65
REYQ192XATJ*	64
REYQ216XATJ*	64
REYQ240XATJ*	64
REYQ264XATJ*	66.5

2. Night setback control of the fan motor for low noise operation by way of automatically limiting the maximum speed shall be a standard feature. Operation sound level shall be selectable from 3 steps.

OPERATION SOUND dB(A)	NIGHT MODE
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	SOUND PRESSURE LEVEL dB(A) APPROX.
Level 1	55
Level 2	50
Level 3	45

E. CONDENSER COIL

1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
4. The fins shall be coated with an anti-corrosion hydrophilic blue coating as standard from factory with a salt spray test rating of 1000hr per ASTM B117 test standards.
5. The outdoor coil shall have three-circuit heat exchanger design eliminating the need for a drain pan heater. The lower part of the coil shall be used for inverter cooling and be on or off during operation enhancing the defrost operation.
 - a. An alternate manufacturer must provide a drain pan heater to enable adequate defrosting of the unit in defrost operation.
6. The condensing unit shall be factory equipped with condenser coil guards on all sides.

F. COMPRESSOR

1. The inverter Flash Vapor injection scroll compressors shall be variable speed (PVM inverter) controlled which is capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit.
 - a. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value.
 - 1) Non-inverter driven compressors, which may cause starting motor current to exceed the nominal motor current (RLA) and require larger wire sizing, shall not be allowed.
2. The inverter driven compressors in the condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll "K-type".
3. Neodymium magnets shall be adopted in the rotor construction to yield a higher torque and efficiency in the compressor instead of the normal ferrite magnet type.
 - a. At complete stop of the compressor, the neodymium magnets will position the rotor into the optimum position for a low torque start.
4. The capacity control range shall be as low as 3% to 100%.
5. The compressor's motor shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.
6. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.

7. Oil separators shall be standard with the equipment together with an intelligent oil management system.
8. The compressor shall be mounted on vibration dampening rubber grommets to minimize the transmission of vibration, eliminating the standard need for external spring isolation.
9. In the event of compressor failure, the remaining compressors, if applicable, shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be manually activated to specifically address this condition for single module and manifold systems.
10. In the case of multiple condenser modules, combined operation hours of the compressors shall be balanced by means of the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost or every 8 hours. When connected to a central control system sequential start is activated for all system on each DIII network.

2.4 BRANCH SELECTOR UNITS

- A. Branch selector boxes are designed specifically for use with VRF heat recovery system components. These selector boxes shall be factory assembled, wired, piped and tested at the factory. When simultaneously heating and cooling, the units in heating mode shall energize their sub-cooling electronic expansion valve.
- B. Unit Cabinet: Cabinets shall have a galvanized steel plate casing. Each cabinet shall house 3 electronic expansion valves for refrigerant control per branch. The cabinet shall contain one sub-cooling heat exchanger per branch. The unit shall have sound absorption thermal insulation material made of flame and heat resistant foamed polyethylene. Nominal sound pressure levels must be measured and published on the submittals by the manufacturer.
- C. Refrigerant Valves: The unit(s) shall be furnished with 3 electronic expansion valves per branch to control the direction of refrigerant flow. The use of solenoid valves for changeover and pressure equalization shall not be acceptable due to refrigerant noise. The refrigerant connections must be of the braze type. In multi-port units, each port shall have its own electronic expansion valves. If common expansion/solenoid valves are used, redundancy must be provided.
- D. Condensate Removal: The unit(s) shall not require provisions for condensate removal. A safety device or secondary drain pan shall be installed by the mechanical contractor to comply with the applicable mechanical code, if an alternate manufacturer is selected.

2.5 CEILING CASSETT INDOOR UNITS

- A. Indoor unit shall be a ceiling cassette fan coil unit, operable with R-410A refrigerant, equipped with an electronic expansion valve, for installation into the ceiling cavity equipped with an air panel grill. The unit shall be a four-way air distribution type, white, impact resistant with a washable decoration panel. The supply air is distributed via motorized louvers which can be horizontally and vertically adjusted from 0° to 90°. Computerized PID control shall be used to control superheat to deliver a comfortable room temperature condition. The unit shall be equipped with a programmed drying mechanism that dehumidifies while limiting changes in room temperature when used with a remote control. The indoor units sound pressure shall range from 29 dB(A) to 34 dB(A) at low speed measured at 5 feet below the unit.
- B. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal

protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory. Both refrigerant lines shall be insulated from the outdoor unit. The 4-way supply air flow can be field modified to 3-way and 2-way airflow to accommodate various installation configurations including corner installations. Return air shall be through the concentric panel, which includes a resin net mold resistant filter.

- C. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump provides up to 21" of lift and has a built in safety shutoff and alarm. The indoor units shall be equipped with a return air thermistor.
- D. All electrical components are reached through the decoration panel, which reduces the required side service access.
- E. Unit Cabinet: The cabinet shall be space saving and shall be located into the ceiling. Three auto-swing positions shall be available to choose, which include standard, draft prevention and ceiling stain prevention. The airflow of the unit shall have the ability to shut down one or two sides allowing for simpler corner installation. Fresh air intake shall be possible by way of direct duct installation to the side of the indoor unit cabinet. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.
- F. Fan: The fan shall be direct-drive turbo fan type with statically and dynamically balanced impeller with high and low fan speeds available. The fan motor shall operate on 208/230 volts, 1 phase, 60 hertz with a motor output range from 0.06 to 0.12 HP. The airflow rate shall be available in high and low settings. The fan motor shall be thermally protected.
- G. Filter: The return air shall be filtered by means of a washable long-life filter with mildew proof resin.
- H. Coil: Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance. The coil shall be a 2-row cross fin copper evaporator coil with 17 FPI design completely factory tested. The refrigerant connections shall be flare connections and the condensate will be 1 -1/32 inch outside diameter PVC. A condensate pan shall be located under the coil.
- I. A condensate pump with a 21 inch lift shall be located below the coil in the condensate pan with a built in safety alarm.
- J. A thermistor will be located on the liquid and gas line.
- K. Electrical: A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts. Transmission (control) wiring between the indoor and outdoor unit shall be a maximum of 3,280 feet (total 6,560 feet). Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.
- L. Controls: The unit(s) shall have controls provided by Daikin to perform input functions necessary to operate the system. The unit shall be compatible with interfacing with a BMS system via optional LonWorks or BACnet gateways.

2.6 MULTI-ZONE CONTROLLER

- A. General: The controller specification below is based on the basis of design manufacturer, Daikin. Controllers meeting these requirements manufactured by Mitsubishi/Trane or Hatachi/JCI shall also be acceptable.
- B. **DCM601A71: intelligent Touch Manager (iTM) V2.XX.XX**
1. The intelligent Touch Manager (version 2.06) shall provide control for all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. It shall be capable of controlling a maximum of 64 indoor unit groups and 128 indoor units connected to a maximum of 10 outdoor units. The intelligent Touch Manager shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.
 2. The controller wiring shall consist of a non-polar two-wire connection to the indoor unit at terminals F1F2 (out-out) of the outdoor unit. The intelligent Touch Manager is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s).
 3. The intelligent Touch Manager can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet interface, Lonworks interface, and Modbus adapter to control the same indoor unit groups. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together. Manual addressing is required of each remote controller group associated with the intelligent Touch Manager. DIII-NET address can be set for one (1) indoor unit or each indoor unit in the remote controller group. No more than 2 remote controllers can be placed in the same group.
 4. The intelligent Touch Manager shall be equipped with two RJ-45 Ethernet ports for 100 Mbps network communication to support interconnection with a network PC via the Internet, Local Area Network (LAN), or connection with a non-networked PC after completed installation.
 5. Web access functions shall be available so that facility staff can securely log into each Intelligent Touch Manager via the PC's web browser to support monitoring, scheduling, error recognition, downloading of system operation data (trend log (refer to pints list under bacnet server)) and general user functions. Error emails are also sent to designated email addresses. An additional optional software function Power Proportional Distribution (PPD) tenant billing shall also be available. The optional software shall require advanced purchase and can only be activated upon receipt of a license activation key from Daikin AC.
- C. Mounting
1. The intelligent Touch Manager shall be mounted on the wall or into the mounting fixtures included with the intelligent Touch Manager.
- D. Display Features
1. The intelligent Touch Manager shall be approximately 11.42" x 9.57" x 1.97' in size with a backlit 10.4" LCD display.
 2. Display information shall be selectable from English, French, Italian, Korean, Dutch, Portuguese, Chinese, Japanese, German, or Spanish.
 3. Featured backlit LCD with auto off after 30 minutes (default) is adjustable between 1 to 60 minutes, or the choice of 3 different screen savers.
 4. Area and Group configuration

- a. Area contains one (1) or more Area(s) or Group(s)
 - b. A Group may be an indoor unit, Di, Dio point that has a DIII-NET address
 - c. A Group may be an external management point such as a Di, Do, Bi, Bo, Bv, Ai, Ao, Av, Mi, Mo, Mv that does not have a DIII-NET address
5. An Area is a tiered group where management points (indoor unit, digital input/output, and analog input/output groups) can be monitored and controlled by global settings. Up to 650 Areas can be created. Area hierarchy can have up to 10 tiered levels (ex. top level: 1st floor West, 2nd level: offices, hallways, 3rd level: Office 101, 102, and 103, etc.). Area configuration shall classify levels of monitoring and control for each management point
- a. Areas and Groups may be assigned names (ex. Office 101, Lobby, North Hallway, etc.)
6. The Controller shall display On/Off, Operation Mode, Setpoint, Space Temperature, Louver Position, Fan Speed for each Area or Group.
7. The Controller shall display Date (mm/dd/yyyy, yyyy/mm/dd, or dd/mm/yyyy format selectable) and day of the week along with the time of day (12hr or 24hr display selectable).
8. The Controller shall adjust for daylight savings time (DST) automatically.
9. Display information shall be updated every 3 seconds to show the latest status of the indoor unit groups.
10. System status icons shall display On/Off (color coded), Malfunction/Error (color coded), Forced Stop, Setback, Filter, Maintenance, and Screen Lock.
11. The controller shall display the temperature setpoint in one degree increments with a range of 60°F – 90°F, 1°F basis (16°C – 32°C, 0.1°C basis).
- a. Display of temperature setpoint information shall be configurable for Fahrenheit or Celsius
12. Display shall reflect room temperature in one tenth degree increments with a range of -58°F – 248°F, 0.1°F basis (-50°C – 120°C, 0.1°C basis) with 0.1°C accuracy.
- a. Display of room temperature information shall be configurable for Fahrenheit or Celsius
13. The Menu List shall be used to configure options and display information for each Area or Group.
14. Error status shall be displayed in the event of system abnormality/error with one of three color coded icons placed over the indoor unit icon or lower task bar.
- a. System errors are generated when the intelligent Touch Manager system with other VRV controls systems are combined incorrectly or power proportional distribution calculation errors occur. The intelligent Touch Manager shall display the error with a red triangle placed on the lower task bar.
 - b. Unit errors occurring within the VRV system shall be displayed with a yellow triangle placed over the indoor unit icon
 - c. Limit errors are based upon preconfigured analog input upper and lower limit settings and are generated when the limits have been met. When limit error is generated a yellow triangle will be placed over the unit icon.
 - d. Communication errors between the intelligent Touch Manager and the indoor units shall be displayed with a blue triangle placed over the indoor unit icon
 - e. Error history shall be available for viewing for up to 500,000 errors/abnormality events with operation events.

15. Layout View

- a. Capable of displaying site floor plan or graphical user interface (GUI) as the background for visual navigation. Indoor unit, DIII-Net Di and Dio, and External Di, Do, Ai, Ao, Av, Mi, Mo, Mv icons with operational status can be placed on the floor layout or GUI
 - 1) Up to 4 status points can be assigned to the indoor unit icon (room name, room temperature, setpoint, and mode)
 - 2) Digital input and output icons will display On/Off status
 - 3) Analog icons will display Ai, Ao and Av.
 - 4) Multistate icons will display Mi, Mo and Mv.
- b. Up to 60 floor layout sections can be created

E. Basic Operation

- 1. Capable of controlling by Area(s) or Group(s)
- 2. Controller shall control the following group operations:
 - a. On/Off
 - b. Operation Mode (Cool, Heat, Fan, Dry, and Auto)
 - c. Independent Cool and Heat dual Setpoints or single Setpoint for current mode in the occupied period
 - d. Controller shall be able to limit the user adjustable setpoint ranges individually for cooling and heating based upon the Area or Group configurations
 - e. Independent Setup (Cooling) and Setback (Heating) setpoints in the unoccupied mode adjustable to 50 - 95°F
 - 1) Setup and Setback setpoints can only be set outside of the occupied setpoint range
 - 2) The Setup and Setback setpoints will automatically maintain a 2°F fixed differential from the highest possible occupied setpoints
 - 3) The recovery differential shall be 4°F (default) and adjustable between 2 – 10°F
 - 4) Settings shall be applied based upon the Area or Group configurations
 - f. Fan Speed
 - 1) Up to 3 speeds (dependent upon indoor unit type)
 - g. Airflow direction (dependent upon indoor unit type)
 - 1) 5 fixed positions or oscillating
 - h. Remote controller permit/prohibit of On/Off, Mode, and Setpoint
 - i. Lock out setting for Intelligent Touch Manager display
 - j. Indoor unit Group/Area assignment
- 3. Capable of providing battery backup power for the clock at least 1 year when no AC power is applied.
 - a. The battery can last at least 13 years when AC power is applied
 - b. Settings stored in non-volatile memory

F. Programmability

1. Controller shall support weekly schedule settings.
 - a. 7 day weekly pattern (7)
 - b. Weekday + Weekend (5 + 2)
 - c. Weekday + Saturday + Sunday (5 + 1 + 1)
 - d. Everyday (1)
 - e. The schedule shall have the capabilities of being enabled or disabled
 - f. 100 independent schedules configurable with up to 20 events settable for each days schedule
 - 1) Each scheduled event shall specify time and target Area or Group
 - 2) Each scheduled event shall include On/Off, Optimum Start, Operation Mode, Occupied Setpoints, Setback Setpoints, Remote Controller On/Off Prohibit, Remote Controller Mode Prohibit, Remote Controller Setpoint Prohibit, Timer Extension Setting, Fan Speed, and Setpoint Range Limit
 - a) Setpoint when unit is On (occupied)
 - b) Configurable Setup (Cooling) and Setback (Heating) setpoints when unit is Off (unoccupied)
 - 3) Time setting in 1-minute increments
 - 4) Timer Extension shall be used for a timed override (settable from 30 – 180 minutes) to allow indoor unit operation during the unoccupied period
 - g. A maximum of 40 exception days can be schedule on the yearly schedule (repeats yearly)
 - 1) Exception days shall be used to override specified days on the weekly schedule based upon irregular occupied/unoccupied conditions
 - 2) Exception days can be configured on a set date (Jan 1) or floating date (1st Monday in September)
2. Controller shall support auto-changeover.
 - a. Auto-change shall provide Fixed (default), Individual, Averaging, and Vote changeover methods for both Heat Pump and Heat Recovery systems based upon the changeover group configuration. This will allow for the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint. The following changeover scheme shall be applicable to the Fixed, Individual, and Averaging methods.
 - 1) Changeover to cooling mode shall occur at cooling setpoint + 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration
 - a) Configurable from 1 – 4°F (0.5 – 2°C)
 - 2) Changeover to cooling mode shall occur at the primary changeover deadband to cooling + 1°F (0.5°C) as the secondary changeover deadband.
 - a) Configurable from 1 – 4°F (0.5 – 2°C)

- 3) Changeover to heating mode shall occur at heating setpoint - 1°F (0.5°C) as the primary changeover deadband and takes the guard timer into consideration
 - a) Configurable from 1 – 4°F (0.5 – 2°C)
 - 4) Changeover to heating mode shall occur at the primary changeover deadband to heating - 1°F (0.5°C) as the secondary changeover deadband.
 - a) Configurable from 1 – 4°F (0.5 – 2°C)
 - 5) A weighted demand shall be configurable for the Averaging and Vote methods.
- b. Fixed Method
- 1) Changeover evaluated by room temperature and setpoint of the representative indoor unit (first registered indoor unit in changeover group) in the changeover group even when it is not operating (must be in Cool, Heat, or Auto mode)
 - 2) Changeover affects all indoor unit groups in the changeover group.
- c. Individual method (recommended for Heat Recovery Systems)
- 1) Changeover evaluated by room temperature and setpoints of the individual indoor unit group in the changeover group
 - 2) Changeover affects individual indoor unit group in the changeover group
- d. Average method
- 1) Changeover evaluated by the average of all indoor unit group's room temperatures and setpoints operating in Cool, Heat, or Auto mode in the changeover group list
 - 2) If none of the indoor units in the group meet the above requirements the Fixed method of changeover will be applied
 - 3) A weighted demand (0 – 3) can be configured for each indoor unit in the changeover group.
 - 4) Changeover affects all indoor unit groups in the changeover group.
- e. Vote Method
- 1) In each indoor unit, the cooling demand is calculated based upon the difference between the room temperature and cooling setpoint. If the room temperature falls below the primary cool changeover point (cool setpoint plus the primary changeover deadband) the cooling demand is considered as 0 (zero). Then the total cooling demand is calculated as the sum of each indoor unit's cooling demand
 - 2) The opposite is true for the total heating demand
 - 3) A weight (0-3) can be added to each indoor unit's demand in the changeover group. The default setting is 1
 - 4) The weight 0 (zero) means the indoor unit's demand is not added in the total demand, so the indoor unit's demand is considered to be 0 (zero)
 - 5) The weight 2 or 3 means the indoor unit's demand is added 2 or 3 times in the total demand, respectively

- 6) Changeover to cooling mode shall occur when the total cooling demand is greater than the total heating demand.
 - 7) The opposite is true for changeover to heating
 - 8) Vote supports a Heating Override option, which prioritizes switching to the heating mode if at least one room temperature falls below the secondary heat changeover point (heat setpoint minus the secondary changeover deadband) even if the total cooling demand is greater than the total heating demand.
 - 9) Changeover affects all indoor unit groups in the changeover group.
- f. Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained to the same outdoor unit in the Heat Pump system or branch selector box in the Heat Recovery system.
- g. Guard timer
- 1) Upon changeover, guard timer will prevent another changeover during the guard timer activation period (15, 30, 60 (default) min).
 - 2) Guard timer is ignored by a change of setpoint manually from either intelligent Touch Manger or Remote Controller, by schedule, or the room temperature meets or exceeds the secondary changeover deadband of the mode opposite of the current mode setting
3. Controller shall support Interlock
- a. Interlock feature for use with 3rd party equipment (DOAS, dampers, occupancy sensing, etc.) to automatically control Groups or Areas corresponding to the change of the operation states or the On/Off states of any Group.
 - b. WAGO I/O unit – Di, Do, Ai, Ao
 - 1) On/Off based monitoring and control of equipment
 - 2) Manual or scheduled operation of equipment
 - 3) Operation based upon interlock with management points (group(s))
 - 4) Monitor equipment error/alarm status
 - 5) WAGO I/O operation data for every minute in the last 5 days are stored and can be downloaded from Web access or USB
 - c. Digital Input/Output (DEC102A51-US2) unit or Digital Input (DEC101A51-US2) unit
 - 1) On/Off based monitoring and control of equipment
 - 2) Manual or scheduled operation of equipment
 - 3) Operation based upon interlock with management points (group(s))
 - 4) Monitor equipment error/alarm status
4. Controller shall support force shutdown of associated indoor unit groups.
- G. Web/Email Function
1. Each intelligent Touch Manager shall be capable of monitoring, operating, and scheduling a maximum of 64 indoor unit groups (up to 512 indoor unit groups with the addition of the iTM Plus Adapter) from a networked PC's web browser. It shall also be capable of creating general user access and sending detailed error emails to a customized distribution list (up to 10 email addresses).
 2. All PCs shall be field supplied
 3. The following operation data stored in iTM every minute for the last 5 days can be accessed and downloaded through ITM web function:

- a. Indoor and outdoor unit (applied model only) operation data.
- b. BACnet Client management data points (AI, AO, AV, BI, BO, BV, MI, MO and MV).
- c. WAGO IO system data points (External DI, DIO, PI, AI and AO).

H. Operational Data History

- 1. Operation data are stored in the iTM every minute for the last 5 days:
 - a. VRV indoor and outdoor unit (if supported) operation data.
 - b. BACnet Client management data points (AI, AO, AV, BI, BO, BV, MI, MO and MV).
 - c. WAGO IO system data points (External DI, DIO, PI, AI and AO).
- 2. The operation data can be exported through the iTM web function or USB output with a user specified time period.
- 3. Airnet addressing required for both indoor units and outdoor units to enable the operation data on the iTM.

I. Software: Licensed per option, per intelligent Touch Manager shall be required.

- 1. DCM014A51: BACnet Server Gateway Option
 - a. The iTM BACnet Server Gateway Option shall be capable of making the intelligent Touch Manager work as a BACnet gateway using the BACnet/IP protocol. The iTM BACnet Server Gateway Option shall be capable of exposing indoor unit management points and indoor/outdoor unit operation data as BACnet objects to the BMS. The iTM BACnet Server/Gateway Option shall be capable of allowing the BMS to monitor and/or control indoor units and outdoor units via BACnet objects.
 - b. The iTM BACnet Server Gateway Option shall support VRV, SkyAir, Outdoor Air Processing Unit, Mini-Split system with use of KRP928, and FFQ indoor unit for Multi-split system.
 - c. The iTM BACnet Server Gateway Option shall support operation data for VRV IDUs only (requires Airnet addressing)
 - d. The iTM BACnet Server Gateway Option shall support operation data for the following VRV IV outdoor units: RXYQ_TATJU, RXYQ_TAYDU, REYQ_TATJU, REYQ_TAYDU(requires Airnet addressing).
 - e. Functions:
 - 1) The iTM BACnet Server Gateway Option shall be capable of supporting Change of Value (COV) notification.
 - 2) The iTM BACnet Server Gateway Option shall communicate to BMS using port number 47808 (configurable).
 - 3) The iTM BACnet Server Gateway Option shall function as BACnet router to provide unique virtual BACnet device identification number (ID) for every indoor unit group address and every outdoor unit device.
 - 4) The iTM BACnet Server Gateway Option shall provide configurable BACnet Network number.
 - 5) The iTM BACnet Server Gateway Option shall be capable of being configured as a foreign device. It shall be capable of communicating across BACnet Broadcast Management Devices (BBMD) in different subnet networks.
 - 6) The iTM BACnet Server Gateway Option shall be run in environments with BACnet communication traffic up to 100 packets/second.
 - 7) The iTM BACnet Server Gateway Option functions shall be configurable through CSV file which shall be downloaded from iTM and configured by trained personnel.

- f. System Capacity
 - 1) A maximum of 128 device IDs (including indoor units groups outdoor units) and a maximum of 4000 BACnet objects can be monitored and/or controlled from a BMS
 - 2) Max of 8 DIII-Net ports shall be connected to iTM.

- g. The Building Management System shall monitor and control the following BACnet objects for indoor units
 - 1) Indoor unit ON/OFF status.
 - 2) Alarm status with error description
 - 3) Room temperature.
 - 4) Indoor Unit ON details
 - a) Off
 - b) Normal [ON]
 - c) Override
 - d) Setback

 - 5) Filter sign status.
 - 6) Fan status.
 - 7) Communication status.
 - 8) Thermo-on status.
 - 9) Compressor status
 - a) On
 - b) Off
 - c) Defrost

 - 10) Aux heater status.
 - 11) Occupancy Mode
 - a) Unoccupied,
 - b) Occupied
 - c) Standby

 - 12) Operation Mode (Cool, Heat, Fan, and Dry)
 - 13) Cooling and Heating setpoints during occupied mode.
 - 14) Cooling and Heating setpoints during unoccupied mode.
 - 15) Maximum and minimum cooling setpoint.
 - 16) Maximum and Minimum heating setpoint
 - 17) Minimum cooling and heating setpoint differential.
 - 18) Fan Speed
 - a) Up to 3 speeds (dependent upon indoor unit type)

 - 19) Vane direction (dependent upon indoor unit type)
 - a) 5 fixed positions or swing position

 - 20) Remote controller permit/prohibit
 - a) On/Off
 - b) Mode,

- c) Setpoint
 - 21) Filter sign reset for indoor units
 - 22) Forced indoor units off.
 - 23) Return air temperature
 - 24) Discharge air temperature
 - 25) Liquid pipe temperature
 - 26) Gas pipe temperature
 - 27) EV position
 - 28) Freeze protection

- h. The Building Management System may choose to monitor and control the following BACnet objects linked to iTM control logic:
 - 1) Enable/Disable iTM Schedule operation.
 - 2) Enable/Disable iTM Auto Changeover Operation.
 - 3) Set Timed Override Minutes.
 - a) Monitor and configure timer extension on iTM (30, 60, 90, 120, 150, 180 minutes)

 - 4) System forced off
 - a) Enable/Disable all emergency stop programs that are registered on the iTM.

- i. Schedule: The BMS shall utilize iTM schedule function or support weekly schedule settings through its programming.
 - 1) BMS schedule shall support the indoor unit:
 - a) Each scheduled event shall specify time and target group address.
 - b) Each scheduled event shall include Occupancy Mode, Operation Mode, Occupied Cooling Setpoint, Occupied Heating Setpoint, and Unoccupied cooling setpoint, Unoccupied heating setpoint, Remote Controller On/Off Permit/Prohibit, Remote Controller Mode Permit/Prohibit, Remote Controller Setpoint Permit/Prohibit, and Timed Override Enable.
 - c) An override shall be provided for use enabling indoor unit operation during the unoccupied period by the BMS programming.

- j. Auto Changeover: The BMS shall utilize iTM Auto changeover function or support auto-changeover through its programming.
 - 1) Auto-change shall provide changeover for both Heat Pump and Heat Recovery systems based upon the group configurations. This will allow the optimal room temperature to be maintained by automatically switching the indoor unit's mode between Cool and Heat in accordance with the room temperature and setpoint temperature.
 - 2) Changeover shall change the operation mode of the indoor unit that is set as the Changeover Master. The Changeover Master indoor unit shall then change the operation mode of all indoor unit groups daisy chained on the same DIII-Net communication bus to the same outdoor unit in the Heat Pump system or the same branch selector box in the Heat Recovery system.
 - 3) Changeover to cooling mode shall occur when the room temperature is great than or equal to the cooling setpoint

- a) Differential to be determined by BACnet building management system programming
- 4) Changeover to heating mode shall occur when room temperature is less than or equal to the heating setpoint.
 - a) Differential to be determined by BACnet building management system programming
- 5) Guard timer
 - a) Upon changeover, guard timer will prevent another changeover during this period.
 - b) Guard timer should be ignored by a change of setpoint manually from the BMS, Intelligent Touch Controller, Remote Controller, or by schedule.
 - c) Guard timer to be configured by BMS programming (30 minute minimum recommended)
- k. Setpoint limitation: The BMS shall utilize maximum and minimum cooling and heating setpoint to configure upper and lower setpoints range.
- l. System shutdown: BMS should utilize System forced off point to execute emergency stop program registered on the iTM.
- m. Restricted functions: The following iTM functions shall be prohibited when the BACnet Server Gateway option enabled:
 - 1) Interlocking Control.
 - 2) Emergency Stop (Emergency stop manual release).
 - 3) Power Proportional Distribution (PPD) option.
 - 4) BACnet Client option.
 - 5) D-Net Service.
 - 6) External Management Point Registration

2.7 THIRD PARTY CONTROLLER

- A. The VRF manufacturer (Under the base bid) shall provide a third-party independent controller (BACnet over IP). This controller is for the control and supervision of miscellaneous, independent equipment. Refer to specification section 230905 for "Sequence of Operations."

2.8 WIRED REMOTE CONTROLLERS – SPACE SENSORS

- A. General: Where indicated, provide wire remote controller, space sensor. Remote controller shall be Daikin model BRC1E73, or equal products from alternate manufacturers. Complete installation, wiring and programming per the manufacturer's recommendations.

2.9 ENERGY RECOVERY UNIT

- A. General: The fresh air ventilation system shall consist of the energy recovery ventilator, incorporating a high-efficiency paper, cross-flow heat exchanger core in order to provide both sensible and latent heat recovery.
- B. Unit Cabinet:

1. The cabinet shall be constructed of galvanized steel plate.
2. The unit shall be internally insulated with a self-extinguishing urethane foam.

C. Fans:

1. The fans shall be direct-drive, forward-curved centrifugal type with statically and dynamically balanced impellers with extra-high, high, and low fan speeds.
2. The fan motor(s) shall operate on 208-230 volts, 1 phase, 60 hertz.
3. The air flow rate shall be available in extra-high, high, and low settings.
4. The fan motor shall be thermally protected.

D. Filter:

1. The supply and exhaust air streams shall be filtered prior to entering the heat exchanger core by means of a multidirectional fibrous fleece filter.

E. Heat Exchanger:

1. The heat exchanger element shall consist of a specially processed, nonflammable, HEP (high efficiency paper) heat exchanger designed to allow the exchange of both sensible and latent energy between the supply and exhaust airstreams. The core material shall be tested as specified in UL 723 and have a flame spread rating of not more than 25, and a smoke developed rating of not more than 50.

F. Electrical:

1. A separate power supply will be required of 208-230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.
2. Transmission (control) wiring between the indoor unit and remote controller shall be a maximum distance of 1,640 feet.

G. Control:

1. The unit shall be compatible with VRF Control System.
2. The unit shall be capable of the following methods of control:
 - a. Independent control – The unit shall be operable directly by a local remote controller.
 - b. Interlocked control – The unit shall be operable in conjunction with a BRF Control System by a local remote controller.
 - c. Centralized control – The unit shall be operable by a centralized control without the need for a local remote controller to be connected.
 - d. Controller must have capability to control electric pre-heater. The electric duct heater on the discharge shall be controlled by a separate discharge air temperature controller (provided by HC). HC shall also provide discharge air sensor to be wired to ERU controller and system for alarm notification.
3. The unit shall be capable of the following modes of operation:
 - a. Energy recovery
 - b. Bypass ventilation – The unit shall be capable of bypass ventilation which diverts air flow around the heat exchanger core. No energy recovery is performed.

- c. Auto Mode – The unit shall be capable of automatically determining the need for performing energy recovery or bypassing the heat exchanger core based on the current fan coil operation mode and the current indoor and outdoor temperatures.
- d. Fresh-up Mode (supply) – The unit shall be capable of entering Fresh-up Supply operation in which the incoming supply air ratio is greater than the exhaust air ratio.
- e. Fresh-up Mode (exhaust) – The unit shall be capable of entering Fresh-up Exhaust operation which in the incoming supply air ratio is less than the exhaust air ratio.
- f. Night Time Free Cooling – The unit shall be capable of Night Time Free Cooling in which the unit will automatically energize to lower the space temperature based on the current outdoor temperature, the current indoor temperature, current set point, and the operating state of the indoor fan coils.

H. Installation

- 1. The unit shall be capable of inverted installation if required by ductwork and access clearance requirements.
- 2. The unit shall not require a condensate drain connection or condensate pan of any kind.

I. Accessories

- 1. Replacement air filters (two).
- 2. DST301BA61 – Schedule Timer
- 3. BRC1E - Navigation Remote Controller

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Variable Flow System is to be installed by a certified installer that has been trained by the manufacturer. Install all system components per the Manufacturer's recommendations. Provide refrigerant pipe, controls and all other accessories needed for a fully complete and operational system.

3.2 STARTUP SERVICE AND DEMONSTRATION

- A. Engage a factory-authorized service representative to perform startup service and to train Owner's maintenance personnel to adjust, operate, and maintain units.
- B. The HVAC contractor with manufacturer's representative are fully responsible to start-up, commission, program controls, verify sequence of operations, test and train the owners representative. HVAC contractor shall submit commissioning plan to the engineer for review.

END OF SECTION 23 80 20

SECTION 23 82 30 – HYDRONIC CONVECTORS

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. This Section includes Hydronic Convectors.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. Color Samples for Initial Selection: For units with factory-applied color finishes.
- D. Operation and Maintenance Data: For convection heating units to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Convectors meeting the full requirements of the specifications, including aesthetic properties, and manufactured by the following will be considered:
 - 1. Slant/Fin.
 - 2. Sterling.
 - 3. Rittling.
 - 4. Sigma.

2.2 HOT-WATER CONVECTORS

- A. Convector elements shall be constructed of copper tubes expanded and rolled into cast brass headers, aluminum fins, steel side plates and fin tube supports. Fins shall have integral fin collars which space the fins and provide a fin-to-tube surface firmly bonded to the tube by mechanical expansion of the tube to help assure durability, eliminate the noise from loose fins and assure

performance at cataloged ratings. All elements shall withstand 100 pounds air pressure factory tested under water.

- B. Free Standing and Wall Cabinets: Cabinet front and top panels shall be fabricated with a minimum 16 gauge steel. End panels shall be no less than reinforced 18-gauge. Cabinet backs shall be phosphatized, galvanized steel. Front, top and sides shall be phosphatized galvanized steel, painted inside and out with a baked-on commercial primer. Fronts shall be secured in place by quick opening front panel fasteners. Cabinet top line rigidity shall be provided by a roll-formed channel section that also permits hinged-type mounting of the cabinet front panel for easy access.
- C. Recessed Cabinets: Cabinets shall have a one-piece minimum 16 gauge steel front panel. Flanges on enclosure at sides and top shall serve as plaster stops. The front shall be sealed against the flanges with a 3/8" (10 mm) sponge rubber to help prevent air leakage and wall streaking. Front panels shall be held in place by quick opening front panel fasteners. Cabinet back and sides shall be phosphatized galvanized steel. Front panels shall be phosphatized galvanized steel and painted inside and out with a baked-on commercial primer.
- D. Cabinet Finish: Refer to drawing schedules for finishes required for each convector. Provide convector units with one of the following finishes, as noted on the drawings:
 - 1. If the drawings indicate a "Standard" color provide a factory applied baked enamel color, selected by the Architect from the manufacturer's standard color chart.
- F. Enclosure Style: Match styles indicated on the drawing schedules.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive convection heating units for compliance with requirements for installation tolerances and other conditions affecting performance. Examine roughing-in for hydronic-piping connections to verify actual locations before convection heating unit installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CONVECTOR INSTALLATION

- A. Install all units level and plumb. Install valves within reach of access door provided in enclosure.
- B. Install air-seal gasketing between wall and recessing flanges or front cover of fully recessed unit.
- C. Install piping within pedestals for freestanding units.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Section. Drawings indicate general arrangement of piping, fittings, and specialties. Provide all specialties indicated.
- B. Unless otherwise indicated, install union, control valve, strainer and ball valve on supply-water connection and union, calibrated balancing valve and ball valve on return-water connection of unit heater.
- C. Install piping adjacent to convection heating units to allow service and maintenance.

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 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.

- B. Remove and replace convection heating units that do not pass tests and inspections and retest as specified above.

END OF SECTION 23 82 30

SECTION 23 82 40 – HYDRONIC CABINET 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 Cabinet heaters with centrifugal fans and hot-water coils.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.
- B. Samples for Initial Selection: Provide color charts, for units with factory-applied color finishes, for color selection by the Architect.
- C. Operation and Maintenance Data: For cabinet heaters.

1.4 QUALITY ASSURANCE

- A. Obtain all cabinet heater units through one source from a single manufacturer, regularly engaged in production of the units.

1.5 EXTRA MATERIALS

- A. In addition to the filter supplied with each cabinet heater, provide **two** extra set of filter(s) for all units installed on the project. When directed by the owner's representative, install both sets of filters if necessary. If additional filter installation is not required all filters shall be given to the owner as extra stock, at the completion of the project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cabinet heaters meeting the full requirements of the specifications including aesthetic properties, and manufactured by the following will be considered:
 - 1. Trane
 - 2. Sterling.
 - 3. ZehnderRittling.

2.2 CABINET UNIT HEATERS

- A. Each unit shall include a cabinet, coil, fan wheel(s), fan casing(s), fan board, and motor(s). The fan board assembly shall be easily removable and include a quick-disconnect motor plug. The construction shall be minimum 18-gage galvanized steel, and continuous throughout the unit. The unit shall be acoustically and thermally insulated with closed-cell insulation. All panels are made rigid by channel forming.
 - 1. Vertical Cabinet and Slope Top Units: Front panel fabrication to be minimum 16-gage galvanized steel. All other panels are 18- gage galvanized steel. Hinged access door construction is 20-gage steel and is flush with top panel.
- B. Cabinet Finish: Refer to drawing schedules for finishes required for each cabinet heater. Provide units with one of the following finishes, as noted on the drawings:
 - 1. If the drawings indicate a "Standard" color; provide a factory applied baked enamel color, selected by the Architect from the manufacturer's standard color chart.
- C. Filters: Filters to be located behind an integral access door on horizontal type units. Filters to be 1" pleated media throwaway (Farr 30/30).
- D. Hot-Water Coil: Hot water coils to be burst tested at 450 psig and leak tested at 100 psig under water. Maximum main coil working pressure to be 300 psig. Tubes and u-bends to be 3/8" OD copper. Fins to be aluminum and mechanically bonded to the copper tubes. Coil stubouts to be 5/8" OD copper tubing.
- E. Fans: Provide aluminum fan wheels to be centrifugal forward-curved and double-width. Fan wheels and housings to be corrosion resistant. Fan housing construction to be formed sheet metal.
- F. Motors: Provide brushless electronically commutated motors (ECM) factory programmed and run-tested in assembled units. The motor controller is mounted in a control box with a built-in integrated user interface and LED tachometer. Provide adjustment through momentary contact switches accessible without factory service personnel on the motor control board. Motors will soft-ramp between speeds to lessen the acoustics due to sudden speed changes. Motors can be operated at three speeds or with a field-supplied variable speed controller. The motor will choose the highest speed if there are simultaneous/conflicting speed requests. All motors have integral thermal overload protection with a maximum ambient operating temperature of 104°F and are permanently lubricated. Motors are capable of starting at 50 percent of rated voltage and operating at 90 percent of rated voltage on all speed settings. Motors can operate up to 10 percent over voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive cabinet heaters for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before unit heater installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 **INSTALLATION**

- A. Install cabinet unit heaters to comply with NFPA 90A.

3.3 **CONNECTIONS**

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Unless otherwise indicated, install union, strainer and ball valve on supply-water connection and union, calibrated balancing valve and ball valve on return-water connection of unit heater.

3.4 **FIELD QUALITY CONTROL**

- A. Perform field tests and inspections as required by the manufacturer. Provide test reports.
- B. Remove and replace malfunctioning units and retest as specified above.
- C. At the direction of the owner's representative, the contractor shall install the extra filters in the respective equipment. If no additional installation is required, the contractor shall forward, to the owner, all extra filters. When forwarding materials obtain a receipt for any materials forwarded.

END OF SECTION 23 82 40

SECTION 23 82 50 – HYDRONIC UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes propeller unit heaters with hot-water coils. Obtain all unit heaters through one source and from a single manufacturer.

1.3 QUALITY ASSURANCE

- A. Obtain all unit heaters through one source from a single manufacturer, regularly engaged in production of the units.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each unit type and configuration.
- B. Operation and Maintenance Data: For unit heaters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Unit heaters meeting the full requirements of the specifications and manufactured by the following will be considered:
 - 1. Trane.
 - 2. Sterling.
 - 3. Zehnder/Rittling

2.2 UNIT HEATERS

- A. Description: An assembly including casing, coil, fan, and motor with adjustable discharge louvers.
- B. Comply with UL 2021 and UL 823.

2.3 CABINETS

- A. Cabinets are constructed from heavy duty cold rolled corrosion resistant steel. Provide a baked finish in the manufacturer's standard color.

- B. Fronts have integral double-folded discharge frame for additional cabinet rigidity. Back panels have integral inlet collars for superior stiffness.
- C. Horizontal units to be furnished with louvres and individually adjustable blades.

2.4 COILS

- A. Standard coils are constructed from heavy wall 5/8" outside diameter copper tube with mechanically bonded aluminum fins. Coils are pressure tested at 350 psig.

2.5 FAN

- A. Fans to be statically and dynamically balanced for quiet, low vibration operation.

2.6 FAN MOTORS

- A. Motors to be totally enclosed with automatic thermal overload protection. Motors to be resilient mounted onto fan guards for quiet, low-vibration operation.
- B. Motor Type: Permanently lubricated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive propeller unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before propeller unit-heater installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install propeller unit heaters level and plumb.
- B. Install propeller unit heaters to comply with NFPA 90A.
- C. Suspend propeller unit heaters from structure with all-thread hanger rods with vibration isolators.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Unless otherwise indicated, install union, strainer and ball valve on supply-water connection and union, calibrated balancing valve and ball valve on return-water connection of unit heater.

3.4 FIELD QUALITY CONTROL

- A. Perform field tests and inspections as required by the manufacturer. Provide test reports.
- B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 23 82 50

SECTION 26 00 10 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division-1:
 - 1. Submittals.
 - 2. Coordination Drawings.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Electrical installations.
 - 7. Cutting and patching.

1.2 SUBMITTALS

- A. Follow the procedures specified in Division 1.
- B. Submit a minimum of eight (8) copies of electrical related Shop Drawings, Product Data, and Samples submitted, to allow for required distribution of each submittal required, which will be retained by the Electrical Consulting Engineer.
- C. Submittals must be provided with all catalog information identified indicating all options to be provided as part of the product. Any submittal not containing this information will be rejected.
- D. Provide the following shop drawings in booklet form:
 - 1. Light fixtures cuts shall be submitted all at one (1) time in a booklet form.
 - 2. panelboards, disconnect switches, manual motor starters, at one time in a booklet form. All equipment shall be of one manufacturer.
 - 3. Wire devices shall be submitted all at one (1) time in a booklet form and be from one (1) manufacturer.
 - 4. Occupancy sensors shall be submitted all at one (1) time in a booklet form and be from one (1) manufacturer whether connected to a lighting control system or provided with power packs, unless noted otherwise.

1.3 PRODUCT REVIEWS AND SUBSTITUTIONS

- A. Refer to Division 1 for substitutions requirements under this contract. Division 1 requirements supersede requirements listed elsewhere.
- B. No Manufacturer's products will be reviewed as an equivalent to the specified products unless submitted by a Bidding Contractor for review ten (10) calendar days prior to bid due date. No products will be reviewed after that time. Product review requests must be submitted in accordance with Division 1 and Section 26 00 10. An addendum will be issued to all Bidding Contractors listing any Manufacturers whose products have been added to the Contract Documents as equivalents to the specified products.

- C. No substitutions will be reviewed by the Engineer after the Bid Due Date unless specifically requested by the Owner in writing with an associated credit with the substitution.

1.4 SHOP DRAWINGS

- A. Refer to the Conditions of the Contract (General and Supplementary) and Division-1 for submittal definitions, requirements, and procedures.
- B. Where submittals include multiple items, a bill of material (not including quantity) shall be provided at the front of the shop drawing. The bill of material shall include product identification, manufacturer and model number.
- C. Submittal of Shop Drawings, Product Data, and Samples will be reviewed only when submitted by the Prime Contractor. Submittals from sub-Contractors and material suppliers directly to the Architect/Engineer will not be reviewed. No equipment/materials shall be installed until the Shop Drawings have been stamped with "No Exceptions Taken" or "Make Corrections Noted" by the Architect/Engineer.
- D. Submit Shop Drawings as listed in each specification section. Following is a list of shop drawings to assist the contractor; however, the contractor shall supply all shop drawings as listed in each individual section whether listed below or not.
 - 1. Power and Lighting Panelboards.
 - 2. Disconnect Switches.
 - 3. Individually-Mounted Circuit Breakers.
 - 4. Disconnect Switches.
 - 5. Fuses.
 - 6. Contactors.
 - 7. Thermal Overload Switches.
 - 8. Wiring Devices and Wall Plates.
 - 9. Dimmer Switches.
 - 10. All Lighting Fixtures (submit in booklet form and with detail drawings where required).
 - 11. Occupancy Sensors.
 - 12. Fire Stopping Material.
 - 13. Access Panels.
- E. When preparing submittals and any required final programming, use a room number schedule generated by the architect and/or the owner, which indicates the actual room numbers that will be used when the building is occupied. If the schedule is not available, revise the initial submittal, when a schedule is available, to reflect the proper room numbers.
- F. Submittal Plans: Submittal plans **MUST** be provided with only the system being presented. Plans not submitted that have not be cleaned of extraneous systems (i.e. a low voltage system being installed on the power drawing, showing all the power and other low voltage systems), will be grounds for immediate rejection without review.

1.5 PRODUCT OBSOLESCENCE

- A. In all cases, the most current iteration of the specified product shall be submitted. Where the specified product is no longer manufactured, the contractor shall submit an equivalent product with the same or better specifications. Where specific manufacturers are specified, the contractor shall supply from the same manufacturer the recommended replacement; however, under no circumstances shall the replacement product be deficient in any aspect to the specified product.

- B. In the submittal for the product, the Contractor shall provide a signed letter clearly indicating the reason for the replacement product, and confirmation that the replacement product meets or exceeds all of the specified product's specifications to the best of the Contractor's knowledge.
- C. The replacement product shall be provided at no additional cost to the owner, and shall not constitute any extension to the project schedule.
- D. These requirements shall be inclusive to requirements listed elsewhere in the specifications, and shall not void any other requirements.

1.6 INSPECTIONS

- A. The Contractor shall provide certificates of approval, in triplicate, for service equipment, building rough wiring, and building finished wiring.
- B. Inspection certificates shall be submitted to the Engineer within 30 days after the inspections are made. Contractor shall use an independent NEC Certified Inspection Agency as the approved agency. Contractor must verify that the Certified Inspection Agency is approved by the local municipality and the Owner to inspect electrical installations in the project locality. All inspection certificates must be received before final payment can be made.
- C. Refer to General Conditions for additional information.
- D. The contractor shall be responsible to provide City of Reading permit and inspection(s). The contractor is responsible for all related costs.

1.7 MANUFACTURER'S REQUIREMENTS

- A. All material shall be new, of the best respective kinds, manufactured by the company or companies mentioned and shall be of domestic manufacture unless specified otherwise.
- B. All equipment, material or apparatus of any one system must be the product of one Manufacturer, or system tested products.
- C. Manufacturers not listed in the Contract Documents must submit to the Engineer via a Bidding Contractor all product information per Division 1 requirements.

1.8 NAMEPLATE DATA

- A. Each item of power operated equipment shall be provided with a permanent operational data nameplate on indicating Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance, and similar essential data. Nameplates shall be located in an accessible location.

1.9 FAMILIARITY WITH PROPOSED WORK

- A. All Contracts are with the understanding that the Contractor, prior to submission of his bid, acquainted himself with the requirements of the Drawings and Specifications, including "Conditions of the Contract," conditions of the site, its terrain, soil conditions, all other requirements of the Contract, and that he obtained all information necessary for completion of the work on or before the

date specified for receiving of bids.

- B. In all cases where a device or part of the equipment is herein referred to in the singular, such reference shall apply to as many such items as are required to complete the installation.
- C. "Existing" information does not necessarily represent "as-built" conditions. The Contractor shall verify all existing conditions. If discrepancies are found the Contractor shall notify the Architect/Engineer for a resolution before proceeding.

1.10 DEFINITIONS

- A. The terms "The Contractor" or "This Contractor" mentioned in these Specifications refers to the Electrical Contractor responsible for the work and equipment included in these Specifications.
- B. The term Sub-Contractor refers to any reference to, or letting of work contained in these Specifications to any Sub-Contractor or Manufacturer by the Prime Contractor. This does not relieve the Prime Contractor of his responsibility for all work, material and equipment in this Specification.
- C. The term "Provide," when used separately, shall mean to "Furnish and Install."
- D. The term "Furnish," when used separately, shall mean to obtain and deliver on the job for installation by other trades.
- E. The term "Install," when used separately, shall mean to mount in place, connect and make operable.

1.11 INTENT OF THE DRAWINGS AND SPECIFICATIONS

- A. The Drawings which accompany the Specifications are for the purposes of illustrating the character and extent of the work, and are subject to such modifications by Architect/Engineer as may be found either necessary or advisable before ordering the prosecution of the work. The Contractor shall conform to and abide by whatever Supplementary Drawings and explanations which may be furnished by the Architect/Engineer for the purpose of illustrating the work. The Architect/Engineer shall decide as to the meaning or intention of any portion of the Specifications and Drawings.
- B. Where the work is shown in complete detail on only half or a portion of a Drawing, or there is an indication of continuation, the remainder being shown in outline, the work drawn out in detail shall be understood to apply to other like portions of the structure. All work that may be called for in the Specifications and not shown on the Drawings, or shown on the Drawings and not called for in the Specifications, shall be executed and furnished by the Contractor as described in both.
- C. Should any incidental work or materials be required, but not set forth in the Specifications or Drawings, either directly or indirectly, but which is necessary to fulfill the intent thereof, the Contractor is to understand same to be implied and required, and he shall perform all such work and furnish all such materials as fully as if they were particularly delineated or described, without additional cost to Owner. This shall include all materials, devices, methods peculiar to the machinery, equipment, apparatus, or systems as described herein.

1.12 EQUIPMENT ENCLOSURE RATINGS

- A. Electrical equipment installed within the building shall carry a NEMA rating 1 or higher if indicated in the specifications or on the drawings.
- B. Electrical equipment installed outside the building, or in environmentally wet locations shall carry a NEMA rating 3R or higher if indicated in the specifications or on the drawings.
- C. Electrical equipment installed in harsh environments (i.e. natatoriums, greenhouses, etc.) shall carry a NEMA rating 4X, and be manufactured from stainless steel.
- D. Where specifications and drawings conflict (i.e. drawings indicated NEMA 3R, but specifications indicate NEMA 1), the higher rating shall be provided at no additional cost to the project.

1.13 WIRING LAYOUTS

- A. Should it become necessary to rearrange any of the circuit or feeder wiring, approval to do so shall first be obtained from the Engineer. The Contractor will be supplied with a spare set of Drawings on which all such approved changes shall be noted. Upon completion of all work under this Contract, these Drawings shall be returned to the Architect/Engineer, who will issue a receipt for same.

1.14 FIELD MEASUREMENTS

- A. Before ordering any materials or doing any work, Contractor shall verify all measurements at the building site, and shall be responsible for correctness of same. At no time shall the Contractor scale Drawings for the purpose of installation.
- B. No extra compensation will be allowed on account of differences between actual dimensions and those indicated on the Drawings. Any difference which may be found shall be submitted to the Architect/Engineer for consideration before proceeding with the work.

1.15 COORDINATION

- A. The Contractor shall cooperate with the other Contractors and shall arrange to eliminate conflicts with the equipment and work of the Contractors.
- B. The Contractor shall be responsible for coordinating all electrical devices/equipment with the casework before rough-in. Any conflicts with casework and electrical devices/equipment shall be brought to the attention of the Architect/Engineer before rough-in. Any electrical device/equipment installed in conflict with casework shall be removed and reinstalled at the Contractor's expense.
- C. The Contractor shall be responsible to coordinate all electrical conduits which are installed for rooftop equipment. Where the equipment can be fed from within the equipment curb, the contractor shall utilize this space. Where the equipment must be fed from the exterior, the contractor shall furnish and install a roof curb designed for conduit penetrations.

1.16 CHASES AND OPENINGS

- A. The Contractor shall determine, in advance, the locations and sizes of all chases and openings necessary for the proper installation of his work and have same provided during construction. Any chase or opening not made during construction, due to the Contractor's failure to determine same in advance, shall be done by the Contractor at his own expense. Any unnecessary cutting shall be repaired to match the original conditions of the area disturbed at the Contractor's expense.

1.17 AIR PLENUMS

- A. The Contractor shall use a conduit system or approved plenum rated wiring for all wiring located above ceilings.

1.18 RECORD DOCUMENTS

- A. Refer to Division-1 for requirements. The following requirements supplement the requirements of Division-1.
- B. Mark Drawings to indicate revisions to conduit size and location; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned from column lines; distribution and branch electrical circuitry; fuse and circuit breaker size and arrangements; support and hanger details; work performed via Change Orders; concealed control system devices.
- C. Mark Specifications to indicate changes by addendum or Change Orders; actual equipment and materials used.

1.19 OPERATION AND MAINTENANCE DATA

- A. Refer to Division-1 for requirements.
- B. Contractor shall provide Operation and Maintenance data listed in individual section in addition to requirements listed in Division 1.

1.20 WARRANTIES

- A. Division 1 warranties shall be considered minimum warranties. Any warranties listed in the individual sections that are longer than Division 1 warranties shall be honored.
- B. Refer to individual sections for warranty requirements beyond those as specified in Division 1.

1.21 TEST AND ADJUST

- A. All systems installed under this Contract shall be tested and adjusted to insure that all equipment and systems meet or exceed the specified requirements.

1.22 PHASE LOAD BALANCE

- A. A reasonable balance shall be secured on the phases of all main distribution feeders and bus bars.

- B. Following installation and with the system in operation, the Electrical Contractor shall check the balance and rearrange connections so that the ampacity on any of the two single-phase phases of the main bus shall not vary more than 10% of each other.

1.23 PAINTING

- A. Refer to the Division-1 for general requirements.
- B. The Contractor shall be responsible for all touch up painting on this project for electrical work.
- C. The Contractor shall be responsible for painting of all conduits that is installed after general painting has been completed.

1.24 CLEANING

- A. Refer to Division-1 Section, "Project Closeout" or "Final Cleaning" for general requirements for final cleaning.
- B. The Contractor shall keep the building free of rubbish and material during the course of construction insofar as the work under this Contract is concerned.
- C. Upon completion of the project, the Contractor shall remove all rubbish, surplus equipment and shipping labels and have all areas broom clean. The Contractor shall thoroughly clean all fixtures, and other electrical equipment, leaving same in first-class working condition.

1.25 INSTRUCTION OF OWNER'S PERSONNEL

- A. The Contractor shall provide instruction of the owner's personnel as outlined in Division 1. The following requirements shall be included in addition to Division 1 requirements.
- B. The Contractor shall provide the services of competent personnel and/or Manufacturer trained personnel to instruct employees designated by the Owner in the proper operation, care and maintenance of the equipment and system installed under the Contract.
- C. A letter of certification itemizing the equipment, system, instructor, and bearing signatures of the employees instructed shall be delivered to the Engineer and the Owner upon completion of the project. The letter of certification shall note the number of hours spent in explanation and actual operation of system with maintenance personnel.

1.26 DELIVERY AND STORAGE OF MATERIALS

- A. Refer to the Division-1 for delivery and storage of materials requirements.
- B. The Contractor shall provide for, or secure use of, suitable-dry storage space for the safe delivery and storage of his materials. The Contractor shall be responsible for providing their own storage trailers on site. The use of Owner's inside-building storage will not be permitted, unless noted otherwise.

1.27 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Responsibility for care and protection of electrical work rests with the Contractor until it has been tested and accepted by the Owner. After delivery, before and after installation, protect equipment and materials against theft, injury, or damage in all cases.
- B. Protect equipment outlets, and pipe openings with temporary plugs, caps, or burlap. Electrical conduit openings shall be covered with capped bushing or fiber disks and bushings.
- C. The contractor shall be responsible to protect all existing electrical or communications equipment to remain from construction dirt and debris, whether created from this contractor or another contractor. The contractor shall determine the method needed to protect each piece of equipment to remain. Should existing equipment be damaged during demolition it will be the responsibility of the contractor to provide necessary repairs or replacement of the damaged equipment.

1.28 PROTECTION OF SENSITIVE ELECTRONICS

- A. During construction activities, the Contractor shall protect all existing sensitive electronics, including, but not limited to Data equipment (network electronics, servers, etc.), intercommunications equipment, telephone equipment, CATV equipment, security equipment and CCTV equipment with a method that will keep all construction dirt and debris from the equipment filters, whether generated by this contractor or other contractors.
 - 1. At a minimum, the Contractor shall build wood frames around all equipment housed in freestanding and wall mounted racks when construction occurs within the vicinity of the equipment. Cover housing with minimum 6mil thick clear plastic. The enclosure shall provide removable access panels to work on equipment and shall be sized to provide sufficient air flow around equipment to avoid excessive heat buildup. The Contractor may propose an alternate protection method prior to construction; however, the Contractor shall be prepared to provide the enclosure if their method is rejected.
- B. Should the equipment be damaged during construction, the contractor shall replace the equipment with the same piece at no additional cost to the owner.

1.29 SCAFFOLDING AND HOISTING

- A. The Contractor shall provide all lumber and other material required for the erection of all staging, scaffolding, shoring, protective platforms, railings and ladders. Scaffolding shall be removed at the completion of the work.
- B. The Contractor shall protect any flooring that is to remain. The Contractor shall inspect the flooring before the scaffolding is installed and report any damage that exists before the start of the construction. The Contractor shall be responsible to repair any damage to the flooring after the scaffolding is removed to the acceptance of the owner at no additional cost to the owner.

1.30 PERMITS AND FEES

- A. Unless noted otherwise, all general permits, certificates, tests, and inspection fees required for the work provided under this contract shall be paid by the Contractor. Refer to General Conditions for additional information.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment Specifications in Divisions-2 through -25 for rough-in requirements.

3.2 CUTTING AND PATCHING

- A. Perform cutting and patching in accordance with Division-1. In addition to the requirements specified in Division-1, the following requirements apply. The Contractor shall be responsible for providing all cutting and patching required to perform his work unless noted otherwise.
- B. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - 1. Uncover work to provide for installation of ill-timed work.
 - 2. Remove and replace defective work.
 - 3. Remove and replace work not conforming to requirements of the Contract Documents.
 - 4. Remove samples of installed work as specified for testing.
 - 5. Install equipment and materials in existing structures.
 - 6. Upon written instructions from the Architect, uncover and restore work to provide for Architect observation of concealed work.
- C. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new work.
- D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
- F. Unless noted otherwise, where equipment is being provided on existing roofing systems, the contractor shall have the owners existing roofing contractor patch where he penetrates the roof. The roof patching must be performed by an authorized vendor of the roofing system, maintaining all existing roofing warranties. The Contractor must contract with the owner's existing roofing vendor.

3.3 PROTECTION OF INSTALLED WORK

- A. During construction activities, including cutting and patching operations, protect adjacent installations.

- B. Patch existing finished surfaces and building components using new materials matching existing materials and experienced installers. For installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.4 ELECTRICAL INSTALLATION

- A. Coordinate electrical equipment and material installation with other building components. Verify all dimensions by field measurements. If no dimensions are given, Contractor shall verify with Architect or Engineer before starting work. At no time shall the Contractor scale Drawings for the purpose of locating items.
- B. Provide for chases, slots, and openings in other building components to allow for electrical installations. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
- C. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- D. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible, or to meet current local, national and ADA codes.
- E. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- F. Install systems, materials, and equipment to conform with submittal data, including Coordination Drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.
- G. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
- H. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- I. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in 26 05 00.
- J. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.5 ELECTRICAL REQUIREMENTS FOR EQUIPMENT INSTALLATION

- A. Conduit and power wiring of required size and voltage, from a panelboard or similar source, shall be furnished and installed by this Contractor, to the equipment furnished by another Contractor. A junction box or means of disconnect (as required) shall be furnished and installed at the equipment by this Contractor meeting the National Electric Code.

- B. Unless noted otherwise, a full complement of electrical control components, required for the intended use and/or operation of specified equipment, including variable frequency controllers, speed controllers and/or other control devices required, whether integral or remote, shall be furnished by the Contractor furnishing the equipment. These control devices as well as power wiring (where required) through these devices shall be installed by this Contractor.

3.6 CONTROL WIRING FOR EQUIPMENT INSTALLED BY ANOTHER CONTRACTOR

- A. This Contractor shall be responsible for providing all required control wiring, (except HVAC system control wiring) for any equipment provided by another Contractor which shall include, but not be limited to, motorized backboards, screens, partitions, curtains, motor operated doors, etc, unless noted otherwise.
- B. The Contractor shall provide all boxes and conduit required for any equipment provided by another Contractor. Control wiring shall also include any wiring of motion or occupancy sensors for doors, curtains, etc.
- C. Coordinate all required work for a complete and functional system with the Contractor supplying the equipment. Make all required connections.

3.7 TEMPORARY ELECTRIC

- A. Refer to Division-1, "General Conditions."
- B. Temporary Electric for Building Construction: Refer to Temporary Facilities for requirements.
- C. Lighting: Provide temporary lighting in accordance with OSHA, (5-footcandles) with local switching to fulfill security requirements and provide illumination for construction operations and traffic conditions.
 - 1. Lamps and Light Fixtures: Provide general service lamps. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

3.8 ELECTRICAL DEMOLITION

- A. The Electrical Contractor shall be responsible for all electrical demolition.
- B. The Contractor shall be responsible for disconnecting and removing from the site all conduit, wiring, light fixtures, devices, panelboards, disconnect switches. The Owner shall tag or notify the Contractor as to any devices, equipment or systems which they wish to salvage before start of each phase of construction. See "Salvage" paragraph 3.14 for additional information.
- C. The Electrical Contractor shall review all demolition drawings, including from other trades, and remove from the site all power wiring and associated electrical equipment, including, but not limited to wire, conduit, boxes, disconnecting means, supports, etc. feeding equipment that is being removed by other trades. This includes within the building, on the roof, attached to the building, and on the site.
- D. Where fastened equipment is removed, the contractor shall be responsible to remove the associated lags or bolts that fastened the equipment down. Grind lags or bolts to below existing surface and patch surface to match existing condition.

- E. All conduit and wiring shall be removed. No existing conduit and wiring shall be abandoned in place.

3.9 ELECTRICAL EQUIPMENT IN AND ABOVE CEILINGS

- A. Where ceilings are being removed to accommodate phasing, the contractor shall tie up all low and line voltage wiring that is resting on the ceiling grid scheduled to remain or feeding a later phase until that wire can be removed.
- B. Any wire that is scheduled to remain shall be independently supported from the structure or walls per the applicable specification sections. Low voltage wire shall be installed in cable tray or j-hooks and line voltage wire shall be installed in conduit and supported per NEC.
- C. Where ceilings are being removed to accommodate phasing, the contractor shall tie up all lighting, fire alarm equipment (smoke detectors, annunciation devices, etc.), intercom speakers, and other electrical equipment until the new ceiling is installed. Electrical devices shall be removed or reinstalled as scheduled on the documents.

3.10 SALVAGE

- A. The Owner reserves the right to salvage any electrical equipment prior to the start of each phase of construction.

END OF SECTION 26 00 10

SECTION 26 05 00 – COMMON REQUIREMENTS – ELECTRICAL CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes materials and methods that are common to various Electrical Systems.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Fireproofing
 - 2. Access Doors

1.3 COORDINATION

- A. Arrange for conduit spaces, chases and openings in building structure during progress of construction to allow for electrical installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are construction as applicable.
- C. Coordinate requirements for access panels and doors for electrical items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 FIRESTOPPING

- A. The Contractor shall be responsible for providing permanent, UL approved firestopping systems for all penetrations through fire rated floor or fire rated wall assemblies. For areas that will require future access for the installation of additional cables, repair, or retrofit, the firestopping system shall consist of re-usable intumescent pillows or putty. All firestopping shall meet the requirements of ASTM E-814 and UL 1479.
 - 1. Subject to compliance with project requirements, firestopping materials may be provided by one of the following Manufacturers.
 - a. Specified Technologies Inc. (STI) Somerville, NJ (800) 992-1180
 - b. Tremco, Beechwood, OH (800) 321-7906
 - c. 3M, St. Paul, MN (800) 328-1687
 - 2. Submit for review the following product data.
 - a. Product data sheets.
 - b. UL System Drawings for each firestopping application.
 - c. Manufacturer's Certificates of Conformance for their products.

2.2 ACCESS DOORS

- A. Refer to Division 8, "Access Doors and Frames" for additional requirements. Access doors furnished and installed under this contractor shall comply with Division 8 requirements in addition to the following.
- B. Manufacturers: Subject to review, provide access doors manufactured by Milcor, Inc or equal.
- C. Description: Steel access doors and frames for installation in masonry and/or drywall/gypsum board assemblies. Provide fire rated access doors when doors are installed in a fire rated assembly.
- D. Frames: minimum 16 gage steel with exposed nominal 1" flange around the perimeter of the unit. Where doors are to be installed in drywall/gypsum board assemblies provide frames with a drywall bead. Doors to be installed in masonry shall be furnished with adjustable metal masonry anchors.
- E. Flush Panel Doors: minimum 14 gage steel with concealed spring or piano hinge(s) with a minimum swing of 175 degrees. Finish to be a factory-applied primer, suitable for field painting. Provide flush cylinder lock with key. Key all locks alike.
- F. Access door schedule: In addition to access door shown on the drawings provide the following access doors to be installed where directed by the architect or engineer:
 - 1. Ten 16" x 16" to be installed in drywall/gypsum construction.
 - 2. Ten 16" x 16" to be installed in masonry construction.

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment Specifications in Divisions-2 through -25 for rough-in requirements.

3.2 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

- A. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
- B. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

3.3 FIRESTOPPING

- A. Comply with manufacturer's written instructions for install fire stopping. When mechanical system is used, set securely in place in accessible locations.
- B. Firestopping shall be installed in all fire rated walls. Review all drawings, including architectural, and site conditions to determine where fire rated walls are located.

3.4 ACCESS DOORS

- A. Comply with manufacturer's written instructions for installing access doors and frames. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces. Install doors flush with adjacent finished surfaces or recessed to receive finish material.
- B. Adjust doors and hardware after installation for proper operation. Remove and replace doors and frames that are warped, bowed or otherwise damaged.

END OF SECTION 26 05 00

SECTION 26 05 19 – WIRES AND CABLES – 600V AND BELOW

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The extent of the wire and cable work is indicated by Drawings and by requirements or other sections of the Specifications for cables used for power, lighting, signal, control and related system rated 600 volts or less. See below paragraph 2.4 B. for permitted use of Type MC Cables on this project.

1.2 CODES AND STANDARDS

- A. NEC Compliance: Comply with applicable requirements of NEC for construction and installation of wires/cables and connectors.
- B. UL Compliance: Comply with UL Stds 83 and 486A, B and C. Provide wiring/cabbling and connector products which are UL-listed and labeled consistent with their uses.
- C. ICEA Compliance: Insulated Cable Engineers Association Inc., Standard WC-5-86.
- D. IEEE Compliance: Institute of Electrical and Electronic Engineers, Standard 82-83.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide all wires and cables of sizes indicated on the Drawings and suitable for the temperature, conditions and location where installed. Install all wire in raceway.

2.2 CONDUCTOR MATERIAL

- A. Use copper conductors of 98% conductivity and rated at 600V for all wires and cables, unless otherwise noted.

2.3 INSULATION

- A. No conductors smaller than No. 12 AWG shall be used unless noted elsewhere. All wires No. 8 AWG or larger shall be stranded. Wire sizes No. 12 and No. 10 AWG. shall be solid (stranded wire used for No. 12 AND 10 will not be permitted unless otherwise noted).
- B. All copper conductors shall be provided with type THHN/THWN insulation, unless noted otherwise
- C. Where aluminum cables are acceptable, their insulation shall either be type THHN/THWN or XHHW-2.

- D. Each circuit shall be provided with a dedicated neutral wire. Sharing of neutral wire for multiple circuits shall not be permitted, unless otherwise noted.

2.4 CABLES

- A. Provide the following in NEC approved locations and project applications where indicated.
- B. Type MC Cable: Provide Metal Clad Cable wiring using two No. 12 AWG with separate copper ground wire (unless noted otherwise). Where AC (armored cable without separate neutral) is installed, Contractor will be required to remove cable and reinstall with approved cable type at no additional cost to the owner. Metal Clad cable may be used on this project only as follows:
 - 1. For lighting and receptacle branch circuits from panel to device(s) or light fixture(s).
 - 2. Connection (to interior) motors (2 feet maximum);
 - 3. Fishing existing walls.
 - 4. Branch circuits in stud walls.
 - 5. Mechanical equipment/miscellaneous branch circuits inside of the building (less than 50amps) where condition warrants.
- C. Where MC cables are run in parallel (i.e. down corridors), the Contractor shall bundle the cables and zip tie them together.
- D. The Contractor shall bear all costs related for removing MC cable not pre-approved. Support and secure type MC cable at intervals not exceeding 6'-0". In addition, type MC cable must be supported within 12" of every fitting, junction box or outlet box that the cable enters.
- E. All other wiring shall be installed in conduit as specified in section 26 05 33, unless approved otherwise by the Engineer prior to installation.
- F. All feeder wiring shall be run in conduit.

2.5 CONNECTORS FOR CONDUCTORS

- A. Provide UL-listed factory-fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

PART 3 - EXECUTION

3.1 WIRES AND CABLES

- A. General: Install electrical cables, wires, and connectors in compliance with NEC. Coordinate cable installation with other work. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.
- B. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.
- C. **While installing cables, care shall be taken to protect outer coating. If outer coating is damaged, contractor shall remove and reinstall cables.**

- D. Conceal all cable in finished spaces. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible. Keep conductor splices to minimum.
- E. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors which are compatible with conductor material.
- F. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal. Provide wire ties and neatly train and rack wires in all boxes, panels, and other areas as required.
- G. Tighten electrical connectors and terminals, including screws and bolts, in accordance with Manufacturer's published torque tightening values. Where Manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.
- H. Each branch circuit shall be provided with a dedicated neutral wire, unless noted otherwise.

3.2 FIELD QUALITY CONTROL

- A. Prior to energizing, cables, 600 Volt or less and size no. 3 or larger, shall be meggered using an industry-approved "megger with a minimum of 500 Volt internal generating voltage. All inspection, cleaning and testing procedures shall be in compliance with the recommendations and standards outlined in the "maintenance testing specifications for electrical power distribution equipment and systems", latest edition, published by International Electrical Testing Association (NETA). Insulation resistance test values shall be no less than 250 megaohms. A typewritten report of all readings shall be prepared and submitted.
- B. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.
- C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.
- D. Color-Coding for Phase Identification:

- 1. Color-code secondary service, feeder, and branch circuit conductors with factory-applied color as follows:

Phase	120/208 Volts	120/240 Volts	277/480 Volts
A	Black	Black	Brown
B	Red	Orange (High-Leg)	Orange
C	Blue	Blue	Yellow
Traveler	Yellow	Yellow	Yellow w/ "T" tag
Neutral	White	White	Gray
Ground	Green	Green	Green w/ Yellow stripe

- 2. Switch legs shall include an additional "S" tag.
- 3. Provide visible colored taped as listed above at all termination points for No. 8 and larger wires.

END OF SECTION 26 05 19

SECTION 26 05 26 – GROUNDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Extent of electrical grounding and bonding work is indicated by Drawings and Schedules and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.
- B. Type of electrical grounding and bonding work specified in this section includes the following:
 - 1. Solidly grounded.

1.2 CODES AND STANDARDS

- A. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.
- B. UL Compliance: Comply with applicable requirements of UL 467, 486A, and 869, pertaining to grounding and bonding of systems, circuits and equipment. Provide grounding and bonding products which are UL-listed and labeled for their intended usage.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. General: Except as otherwise indicated, provide electrical grounding and bonding system assembly of materials, including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for a complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.
- B. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding system connections that match power supply wiring materials and are sizes according to NEC.
- C. Bonding Plates, connectors, Terminals, and Clamps: Provide electrical bonding plates, connectors, terminals, lugs and clamps as recommended by bonding plate, connector, terminal and clamp Manufacturers for indicated applications.
- D. Ground Electrodes and Plates:
 - 1. Grounding Electrodes: Solid copper, 5/8" diameter by 10 feet.
 - 2. Grounding Electrodes: Steel with copper welded exterior, 3/4" diameter by 10 feet.

- E. Electrical Grounding connection Accessories: Provide electrical insulating tape, heat shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories Manufacturers for type service indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Architect/Engineer in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEM

- A. General: Install electrical grounding and bonding system as indicated, in accordance with Manufacturer's instructions and applicable portions of NEC, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.
- B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.
- C. Branch Circuits: Install a minimum 12 AWG ground wire in each 20A circuit and conduit run and to connect to each device. Size larger circuit ground wires as per NEC Table 250-122.
- D. Exothermically weld grounding conductors to underground grounding electrodes.
- E. Ground electrical service system neutral at service entrance equipment to grounding electrodes per NEC Article 250. Grounding conductor shall be 4/0 copper, unless otherwise noted.
- F. Ground each separately-derived system neutral to separate grounding electrode.
- G. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.
- H. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.
- I. Connect grounding electrode conductors to copper electrodes as per N.E.C., building steel and 1" diameter, or greater, metallic cold water pipe using a suitably sized ground clamp. Provide grounding electrode connection to concrete slab rebar to meet NEC. Provide 4/0 copper conductor for all connections.
- J. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with Manufacturer's published torque tightening values for connectors and bolts. Where Manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.
- K. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.

- L. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory-applied protective coatings have been destroyed, which are subjected to corrosive action.
- M. Install clamp-on connectors on clean metal contact surfaces, to ensure electrical conductivity and circuit integrity.
- N. Provide ground wire connection to all electrical boxes and wiring devices.
- O. Bond service ground conduit to grounding conductor if conduit is metallic.
- P. The contractor shall be responsible to provide grounding connection on gas piping where an appliance or mechanical piece of equipment has gas and electric circuit run to it. The ground conductor size shall be the same size as the electrical branch circuit run to the appliance or equipment to meet the NEC. article 250.

3.3 FIELD QUALITY CONTROL

- A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester. Where tests show resistance-to-ground is over 25 ohms, take appropriate action to reduce resistance to 25 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance.
- B. The contractor shall be responsible to test grounding system on site and turnover documentation to owner that grounding system is compliant with specifications.
- C. Contractor shall coordinate with local inspector to provide tests as required.

END OF SECTION 26 05 26

SECTION 26 05 29 – SUPPORTING DEVICES

PART 1 - GENERAL

1.1 CODES AND STANDARDS

- A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical supporting devices.
- B. NECA Compliance: Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.
- C. UL Compliance: Provide electrical components and devices which are UL-listed and labeled.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide supporting devices which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation; and as herein specified. Where more than one (1) type of device fulfills indicated requirements, selection is Installer's option.

2.2 SUPPORTS

- A. Provide supporting devices of types, sizes and materials indicated; and having the following construction features:
- B. Clevis Hangers: For supporting up to 2" rigid metal conduit; galvanized steel; with 2" diameter hole for round steel rod; approximately 54 pounds per 100 units.
- C. Riser Clamps: For supporting up to 5" rigid metal conduit; black steel; with 2 bolts and nuts, and 4" ears; approximately 510 pounds per 100 units.
- D. Reducing Couplings: Steel rod reducing coupling, 2" x 5/8", black steel; approximately 16 pounds per 100 units.
- E. C-Clamps: Black malleable iron; 2" rod size; approximately 70 pounds per 100 units.
- F. I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flanges width 2"; approximately 52 pounds per 100 units.
- G. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; approximately 7 pounds per 100 units.
- H. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.
- I. Hexagon Nuts: For 2" rod size; galvanized steel; approximately 4 pounds per 100 units.

- J. Round Steel Rod: Black steel; 2" diameter; approximately 67 pounds per 100 feet.
- K. Offset conduit clamps: For supporting 2" rigid metal conduit; black steel; approximately 200 pounds per 100 units.

2.3 ANCHORS

- A. Provide anchors of types, sizes and materials indicated; and having the following construction features:
- B. Lead Expansion Anchors: 2"; approximately 38 pounds per 100 units.
- C. Toggle Bolts: Spring head; 3/16" x 4"; approximately 5 pounds per 100 units.
- D. Manufacturers: Provide anchors of one of the following (for each type of anchor):
 - 1. Ackerman Johnson Fastening Systems, Inc.
 - 2. Ideal Industries, Inc.
 - 3. Joslyn Manufacturing and Supply Co.
 - 4. McGraw Edison Co.

2.4 SLEEVES AND SEALS

- A. Provide sleeves and seals, including armored cable seals, of types, sizes, and materials indicated, with the following construction features:
- B. Sleeve Seals: Provide sleeves for piping which penetrated foundation walls below grade, or exterior walls. Caulk between sleeve and pipe with non-toxic, UL-classified caulking material to ensure watertight seal.
- C. Wall and Floor Seals: Provide watertight wall and floor seals, or types and sizes indicated; suitable for sealing around conduit, pipe, of tubing passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
- D. Fire-Rated Walls and Floors: At all locations where conduits, cables, or ducts penetrate a fire-rated wall or floor, a special fire-retardant caulking compound or other approved device as specified in section 26 05 00 shall be used.

2.5 CONDUIT CABLE SUPPORTS

- A. Provide cable supports with insulating wedging plug for non-armored type electrical cables in risers; construct for 2" rigid metal conduit; 3-wires, type wire as indicated; construct body of malleable-iron casting with hot-dip galvanized finish.

2.6 U-CHANNEL STRUT SYSTEMS

- A. Provide U-channel strut system for supporting equipment supplied under this contract, 12-ga hot-dip galvanized steel, or types and sizes indicated; construct with 9/16" diameter holes, 8" on center on top surface, with standard green finish, and with the fittings which mate and match with U-channel. The Contractor is responsible to size and install strut to meet properly support its intended load.
- B. Auxiliary Steel Supports: Provide all required auxiliary steel to install any equipment supplied under this contract. The design and gauge of steel used shall be as required by the manufacturer's specifications. The Contractor is responsible to size and install auxiliary steel to properly support its intended load.
- C. Drop Cords: At Drop Cord locations provide miscellaneous threaded rod, unistrut, steel plates, etc. to vertically and laterally support Drop Cord. Where drop cord is located on ceilings provide proper support to prevent movement and damage to ceiling tile.
- D. Manufacturers: Provide U-channel strut systems of one of the following (for each type system):
 - 1. Allied Tube and Conduit Corp.
 - 2. Midland-Ross Corp.
 - 3. OZ/Gedney Div; General Signal Corp.
 - 4. Power-Strut Div; Van Huffel Tube Corp.
 - 5. Unistrut Div; GTE Products Corp.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices. Comply with installation requirements of NECA and NEC pertaining to supporting devices.
- B. Coordinate with other mechanical and electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.
- C. Where supports or anchors are installed after the spray on insulation and/or firestopping is installed, patch the spray on insulation and/or firestopping to match surrounding area.

END OF SECTION 26 05 29

SECTION 26 05 33 – RACEWAYS

PART 1 - GENERAL

1.1. DESCRIPTION OF WORK

- A. The extent of the raceway and work required by this section is indicated by Drawings and requirements of other sections of this Specification.
- B. Provide metal and nonmetallic conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) for each service indicated on plans. Where types and grades are not indicated, provide proper selection determined by installer to fulfill wiring requirements and comply with applicable portions of NEC for raceways.
- C. It is the intent of these Specifications and Drawings that all feeder wiring be run in a continuous conduit system. Type MC cables are permitted for lighting and power, branch circuits above ceilings and in stud walls, fishing existing walls, and connection to equipment/motors (2 feet max). In areas of exposed structure all wiring shall be run in conduit. At all locations where MC cable cannot be fished in an existing wall, surface (non metallic or metallic as specified) raceway shall be used. Finish of raceway shall be verified with the engineer before ordering. Surface raceway shall be screwed into the surface being installed at both ends and every 24" minimum along raceway. All surface raceway shall be run parallel and perpendicular to wall surfaces and run to blend in with surrounding equipment. There shall be no additional cost to install surface raceway to the owner.
- D. Refer to section 26 05 19 for acceptable uses of MC cables.

1.2. CODES AND STANDARDS

- A. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
- B. UL Compliance and Labeling: Comply with provisions of UL safety standards pertaining to electrical raceway systems; provide products and components which have been UL-listed and labeled.
- C. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of raceway systems.

PART 2 - PRODUCTS

2.1. CONDUITS

- A. Rigid Steel Conduit: Provide rigid steel, zinc-coated, threaded type conforming to FS WW-C-581, ANSI C80.1 and UL 6. Provide zinc-coating fused to inside and outside walls.
- B. Rigid Aluminum Conduit: Provide rigid aluminum, threaded type conforming to ANSI and UL standards.

- C. Intermediate Steel Conduit: Provide rigid intermediate grade (IMC) hot-dip galvanized threaded conforming to FS WW-C-581 and UL 1242.
- D. Electrical Metallic Tubing (EMT): FSW-C-563, ANSI C80.3, and UL 797.
- E. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct of single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).
- F. Flexible Metal Conduit: FS WW-C-566 and UL 1. Formed from continuous length of spirally wound, interlocked zinc-coated strip steel.
- G. PVC Heavy Wall Conduit: Schedule 40, 90C, UL-rated, constructed of polyvinyl chloride and conforming to NEMA TC-2, for direct burial, UL-listed and in conformity with NEC Article 347. PVC conduit may only be installed above finished grade, where specifically indicated on the drawings or within the specifications.
- H. PVC Light Wall Conduit shall not be acceptable under any circumstances. PVC Heavy Wall conduit shall be used when encased in concrete.
- I. No other type of conduit shall be used, unless otherwise noted, or prior approval granted by the engineer.

2.2. CONDUIT FITTINGS

- A. Flexible Metal Conduit Fittings: Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type.
- B. Straight Terminal Connectors: Contractor shall provide one-piece body, with female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
- C. 45-Deg or 90-Deg Terminal Angle Connectors: Two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
- D. Rigid Metal Conduit Fittings: Cast-malleable-iron, galvanized or cadmium plated, conforming to FS W-F-408. Use Type 1 fittings for raintight connections, Type 2 fittings for concrete tight connections, and Type 3 fittings for other miscellaneous connections.
- E. Rigid Aluminum Conduit Fittings: Provide cast-aluminum conduit fittings and mounting hardware conforming to ANSI and UL standards of types required for the application.
- F. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G. Provide cadmium-plated, malleable-iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated, or non-insulated throat.
- G. EMT Fittings: All couplings and connectors shall be of the compression type.
- H. PVC Heavy Wall Conduit and Tubing Fittings: Mate and match to conduit or tubing type and material.

- I. Conduit and Tubing Accessories: Provide conduit, tubing and duct accessories of types, sizes, and materials, complying with Manufacturers' published product information, which mate and match conduit and tubing.
- J. Conduit Bodies: Provide galvanized cast-metal conduit bodies of types, shapes, and sizes as required to fulfill job requirements and NEC requirements. Construct conduit bodies with threaded-conduit entrance ends, removable covers, either cast or galvanized steel, and corrosion-resistant screws.
- K. All raceway conduit and fittings above a ceiling shall be plenum rated.
- L. Press type fittings may not be used unless specifically specified to be acceptable elsewhere in the specifications or on the drawings.

2.3. WIREWAYS

- A. General: Provide electrical wireways of types, grades, sizes, and number of channels for each type of service as indicated. Provide complete assembly of raceway including, but not limited to, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other components and accessories as required for complete system.
- B. Lay-In Wireways: Provide lay-in wireways with hinged covers, in accordance with UL 870 and with components UL-listed, including lengths, connectors and fittings. Design units to allow fastening hinged cover closed without use of parts other than standard lengths, fittings and connectors. Construct units to be capable of sealing cover in closed position with sealing wire. Provide wireways with knockouts.
- C. Connectors: Provide wireway connectors suitable for "lay-in" conductors, with connector covers permanently attached that removal is not necessary to utilize the lay-in feature.
- D. Finish: Protect sheet metal parts with rust inhibiting coating and baked enamel finish. Plate finish hardware to prevent corrosion. Protect screws installed toward inside of wireway with spring nuts to prevent wire insulation damage.
- E. Raintight Troughs: Construct in accordance with UL 870, with components UL listed.
- F. Construction: 16-ga galvanized sheet metal parts for 4" x 4" to 6" x 6" sections, and 14-ga parts for 8" x 8" and larger sections. Provide knockouts only in bottom of troughs, with suitable adapters to facilitate or tear during installation, or would compromise raintight capability of the trough. Do not use cover screws that will protrude into the trough area and damage wire insulation.
- G. Finish: Provide 14-ga and 16-ga galvanized sheet metal parts with corrosion-resistant phosphate primer and baked enamel finish. Plate hardware to prevent corrosion.

2.4. SURFACE RACEWAY

- A. Provide single or dual channel surface raceway as specified on the drawings. Unless noted otherwise, raceway finish shall be selected at shop drawings from full list of standard and premium finishes.
- B. Device plates matching the raceway system shall be utilized. Standard wall mounted device plates shall not be acceptable.

PART 3 - EXECUTION

3.1. GENERAL

- A. Low voltage wiring in walls must be run in conduit system rated for 600V, as specified above. the use of flexible innerduct material in walls shall not be acceptable. In new construction, conduits shall be rigid of appropriate type for the installation.
- B. Unless noted otherwise, all conduit shall be installed concealed in walls, under slabs, or above ceilings.
- C. Type MC cables shall be permitted only as noted.
- D. Unless noted otherwise, raceways and cables shall be installed near the structure and be supported independently from the structure. Support systems for other building systems (i.e. ductwork, HVAC equipment, system piping, ceiling supports, etc.) shall not be used to support conduits and cables. When routed from light fixtures and other system connections, raceways and cables shall be routed directly vertical to structure and across. Drop wire supports shall not be used on any ceiling support wires under any circumstances.
- E. Use PVC Schedule 40 conduit where feeders and service conductors are embedded in concrete, masonry, or earth, and use rigid galvanized steel elbows with large sweep elbows wherever turns are needed (**do not use PVC elbows**). Where PVC conduit is installed below finished floor level within the building pad, contractor shall transition to an approved type of above ground conduit within the floor slab, at the elbow. Where PVC conduit is used exterior to the building under finished grade, contractor shall transition to galvanized rigid steel conduit at the elbow up, and continue using galvanized rigid steel along the riser to above finished grade.
- F. PVC Schedule 40 conduit may be run in CMU wall cavities when originating from below finished grade and terminating at a recessed box no higher than 48" above finished floor or grade. For all other installations within wall cavities, PVC conduit shall not be used.
- G. Use rigid aluminum conduit where installed exposed outdoors.
- H. Use EMT conduit in mechanical equipment rooms, electrical equipment rooms, penthouses, crawl spaces, walls, and areas above ceiling.
- I. Use flexible metal conduit in moveable partitions and from outlet boxes to recessed lighting fixtures, and final 24" of connection to motors, or control items subject to movement or vibration, and in cells of precast concrete panels. Conduit size shall be increased as required to fit wiring per NEC.
- J. Use liquid-tight flexible metal conduit in mechanical spaces. Conduit size shall be increased as required to fit wiring per NEC.
- K. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.
- L. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameters.
- M. Size conduits to meet NEC, except no conduit shall be smaller than 3/4" on this project.

- N. Fasten conduit terminations in sheet metal enclosures by two locknuts, and terminate with bushing. Install locknuts inside and outside enclosure. **Metallic insulating conduit bushings shall be used on all power conduits.** Split bushings shall not be acceptable.
- O. Conduits are not to cross pipe shafts or ventilating duct openings.
- P. Keep conduits a minimum distance of 6" from parallel runs of hot water pipes or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
- Q. Support riser conduit at each floor level with clamp hangers.
- R. Use of running threads at conduit joints and terminations is prohibited.
- S. Where required, use 3-piece union or split coupling.
- T. Complete installation of electrical raceways before starting installation of cables/wires within raceways.
- U. For concrete floors-on-grade, install PVC Schedule 40 conduits under concrete slabs.
- V. Install underground conduits minimum of 24" below finished grade.
- W. Install conduits so as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.
- X. Above requirements for exposed conduits also apply to conduits installed in space above hung ceilings, and in crawl spaces.
- Y. **Conduits shall not be installed against roof deck. Allow minimum 3" space between top conduit and roof deck for the possible penetration of roof nails to protrude without damaging conduit.**
- Z. In finished spaces without ceilings (i.e. gymnasiums, natatoriums, etc.), conduits shall be installed as high as possible, while meeting other requirements within these specifications. Conduits along bottom cord of open joists shall not be acceptable. Where conduits need to be installed along bottom of joists or beams, they shall be installed against walls.
- AA. Provide fish wire or pull string in all spare conduits.
- BB. Cap all spare conduits installed for future use.
- CC. Install surface metal raceways in corners or walls or conceal as much as possible.
- DD. There shall be no more than three (3) 20A branch circuits installed in a single 3/4" conduit. Each circuit shall be provided with a dedicated neutral wire. Sharing of neutral wire for multiple circuits will not be permitted.
- EE. At locations where conduits are installed after painting is done, the contractor shall be responsible to go back and paint conduit and boxes same color to match.
- FF. Metallic and non-metallic raceway shall be mechanically fastened to surfaces at intervals as recommended by the manufacturer. Under no circumstances shall glue, two-sided tape, or other type of adhesive be the only means of attachment.

GG. For exterior wall or foundation penetrations, seal around conduits/sleeves and annular space between sleeve and conduits to limit water migration.

1. Select seal material to fit the installation location, and ensures no degradation of the sealing material over time due to environmental conditions including, but not limited to continuous ground or rain water, solar impact, temperature changes, freezing, etc. Where exposed, sealing compound shall match adjacent surfaces in texture and color.

HH. Where conduits are installed to pass through existing walls, the wall shall be cored to allow the conduit to be installed through the wall, and fire calk installed around the conduit. Should MC cable be installed through a wall, an EMT sleeve of sufficient size to fit all of the MC cables shall be installed through a core in the wall, fire calk installed around the sleeve, and fire putty installed around the MC cable. Should the contractor break out blocks, or cut an opening in the wall, not using a properly sized hole saw, he shall provide an appropriately sized lintel to maintain structural integrity of the wall, patch the wall by toothing in new block, new drywall sheet, or other means matching the wall material, and provide fire calk around the conduit or sleeve in the opening.

3.2. EXPOSED CONDUITS

- A. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of building.
- B. Install exposed conduit work as not to interfere with ceiling inserts, lights, or ventilation ducts or outlets.
- C. Support exposed conduits by use of hangers, clamps, or clips. Support conduits on each side of bends and on spacing not to exceed following: Up to 1": 6'-0"; 1-1/4" and over: 8'-0".
- D. Run conduits for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.
- E. Cap all spare and active conduits stubbed up from the floor with secure PVC caps. Caps used for active conduits shall be notched to accommodate the quantity and size of cables installed in each conduit.
- F. Exposed conduits shall be run along walls and at 3" from roof deck. – deck screws, gym, etc.
- G. Where exposed conduits are installed outside of spaces labeled as electrical or mechanical, they shall be prepped and painted with appropriate products to match adjacent surfaces, unless specifically stated, in writing, by the architect/engineer/owner that they may remain unfinished.

3.3. NON-METALLIC CONDUITS

- A. Make solvent cemented joints in accordance with recommendations of Manufacturer.
- B. Install PVC conduits in accordance with NEC and in compliance with local utility practices. Provide expansion joints as required by Manufacturer and NEC.

3.4. CONDUIT FITTINGS

- A. Construct locknuts for securing conduit to metal enclosure with sharp edges for digging into metal, and ridged outside circumference for proper fastening.
- B. Bushings for terminating conduits smaller than 1-1/4" are to have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation.
- C. Install insulated type bushings for terminating conduits 1-1/4" and larger.
- D. Bushings are to have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.
- E. Bushing of standard or insulated type to have screw type grounding terminal.
- F. Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs to be specifically designed for their particular application.

3.5. RACEWAYS AND WIREWAYS

- A. Avoid use of dissimilar metals through system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.
- B. Install expansion fittings in all raceways/wireways wherever structural expansion joints are crossed.
- C. Make changes in direction to raceway/wireway run with proper fittings, supplied by raceway Manufacturer. No field bends of raceway/wireway sections will be permitted.
- D. Properly support and anchor raceways/wireways for their entire length by structural materials. Raceways are not to span any space unsupported.
- E. Use boxes as supplied by Manufacturer wherever junction, pull or device boxes are required. Standard electrical "handy" boxes, etc., shall not be permitted for use with surface installations.

END OF SECTION 26 05 33

SECTION 26 05 35 – ELECTRICAL BOXES AND FITTINGS

PART 1 - GENERAL

1.1. DESCRIPTION OF WORK

- A. The extent of electrical box and associated fittings work is indicated by Drawings and Schedules.

1.2. CODES AND STANDARDS

- A. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings.
- B. UL Compliance: Comply with UL Std No.'s 50, 514-series and 886. Provide electrical boxes and fittings which are UL-listed and labeled.
- C. NEMA Compliance: Comply with applicable requirements of NEMA Stds/Pub No.'s OS1, OS2 and Pub 250.

PART 2 - PRODUCTS

2.1. FABRICATED MATERIALS

- A. Outlet Boxes: Provide galvanized coated flat-rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated (or as required), suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding. Flush boxes must be mounted flush with finished wall surface.
- B. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code - compliance option.
- C. Device Boxes: Provide galvanized coated flat-rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated (or as required), suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cables clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding. Flush boxes must be mounted flush with finished wall plate.

- D. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's codes-compliance option.
- E. Surface-Mounted Device and Outlet Boxes: Provide a minimum depth galvanized-coated steel box where indicated on the Drawings without pre-punched knockouts.
- F. Raintight Outlet Boxes: Provide corrosion-resistant cast-metal raintight outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit holes for fastening electrical conduit, including face plate gaskets and corrosion-resistant plugs and fasteners.
- G. Junction and Pull Boxes: Provide galvanized code-gauge sheet steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers. Provide handles on covers over 4 square feet.
- H. Where surface or recessed boxes are indicated to be blank or with wire leads for future use, they shall be provided with blank covers per Division 26 "Wiring Devices".
- I. **Under no circumstances shall low voltage rings be used on the project. All outlet boxes used for low voltage system including, but not limited to tele/data, controls, A/V wiring, etc. shall be fully enclosed device boxes as specified above.**

PART 3 - INSTALLATION

3.1. GENERAL

- A. Install electrical boxes and fittings as indicated, in accordance with Manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. When installed in stud walls (wood or steel), electrical boxes shall be installed in walls, supported from both sides, bridged between studs, the use of cantilevered supports shall be unacceptable.
- C. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.
- D. Provide weathertight outlets for interior and exterior locations exposed to weather or moisture.
- E. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- F. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring.
- G. Wherever possible, avoid installing boxes back-to-back in walls. Provide not less than 6" (150mm) separation or separate stud spaces.
- H. Position recessed outlet boxes accurately to allow for surface finish thickness.

- I. Where devices are shown at casework, contractor shall coordinate exact location and height with casework to ensure usability of devices.
- J. Avoid using round boxes where conduit must enter box through side of box, which would result in difficult and insecure connections when fastened with locknut or bushing on rounded surfaces.
- K. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.
- L. Provide electrical connections for installed boxes.
- M. Subsequent to installation of boxes, protect boxes from construction debris and damage.
- N. Ground electrical boxes properly upon completion of installation work and demonstrate compliance with requirements. Ground electrical box and wiring device.

3.2. INSTALLATION TO MEET ACOUSTICAL PERFORMANCE

- A. In order to reduce sound transmission through walls, when back boxes are installed to serve both sides of the wall, they shall be installed in different stud cavities. Where boxes are found to be installed in the same stud cavity, feeding two different sides of the wall, they will be required to be removed and reinstalled at the contractor's expense.

END OF SECTION 26 05 35

SECTION 26 05 53 – ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 CODES AND STANDARDS

- A. UL Compliance: Comply with UL Std 969.
- B. NEC and NEMA Compliances: Comply with NEC and NEMA WC-1 and WC-2.
- C. ANSI Compliance: Comply with ANSI Std A13.1.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Except as otherwise indicated, provide Manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is installer's option, but provide single selection for each application.

2.2 CABLE/CONDUCTOR IDENTIFICATION BANDS

- A. Provide Manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type; either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification.

2.3 SELF-ADHESIVE PLASTIC SIGNS

- A. Provide Manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application areas and adequate for visibility, with proper wording for each application (e.g., "EXHAUST FAN FED FROM PANEL PD1").
- B. Colors: Unless otherwise indicated, or required by governing regulations, provide white signs with black lettering.

2.4 ENGRAVED PLASTIC-LAMINATE SIGNS

- A. Provide engraving stock melamine plastic laminate with black face and white core plies (letter color), complying with FS L-P-387, in sizes and thicknesses indicated. Engrave laminate with engraver's standard letter style of sizes and wording indicated, and punch for mechanical fastening except where adhesive mounting is necessary because of substrates.
- B. Thickness: 1/16", for units up to 20 sq. in. or 8" length; 1/8" for larger units.
- C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

2.5 LETTERING AND GRAPHICS

- A. Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by Manufacturers or as required for proper identification and operation/maintenance of electrical systems and equipment systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

2.6 MANUFACTURER

- A. Provide electrical identification products of one of the following (for each type marker):
 - 1. Ideal Industries, Inc.
 - 2. LEM Products, Inc.
 - 3. Markal Company
 - 4. National Band and Tag Co.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install electrical identification products as indicated, in accordance with Manufacturer's written instructions, and requirements of NEC.

3.2 COORDINATION

- A. Where identification is to be applied to surfaces which require finish, install identification after completion of painting.

3.3 REGULATIONS

- A. Comply with governing regulations and requests of governing authorities for identification of electrical work.

3.4 CABLE/CONDUCTOR IDENTIFICATION

- A. Apply cable-conductor identification where wires of communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings, Contract Documents, and similar previously established identification for project's electrical work.
- B. Install engraved plastic-laminate tags on new power cables in all manholes and in pullboxes to identify over current device number. Use tie wraps to attach tag to cables. The nameplate shall bear the following information: Building served; voltage, cable size, class of insulation, phase designation.

3.5 DANGER SIGNS

- A. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations indicated and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about project.
- B. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110-120 volts.
- C. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

3.6 ARC FLASH LABELS

- A. Provide arc flash labels on equipment per NEC and NFPA. Labels shall be placed in a prominent position that is clearly visible before access to a dangerous area is reached. This includes the front of devices similar to disconnect switches, motor starters, switchboards, etc. and just inside the front cover of panelboards. The labels shall be of sufficient durability to withstand the environment involved.
- B. Provide signs for each unit of the following categories of electrical work.
 - 1. Panelboards, electrical cabinets and enclosures.
 - 2. Disconnect switches.

3.7 EQUIPMENT/SYSTEM IDENTIFICATION

- A. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2" high lettering on 1-1/2" high sign (2" high where 2 lines are required), White lettering in Black field. Provide text matching terminology and numbering of the Contract Documents and shop drawings. Each listed piece of equipment below shall have a sign that has the following: 1. Equipment Name, 2. Where the equipment is fed from. Example: PANEL "PD1" (FED FROM PANEL DPD).
- B. Provide signs for each unit of the following categories of electrical work.
 - 1. Panelboards, electrical cabinets and enclosures.
 - 2. Access panel/doors to electrical facilities.
 - 3. Disconnect switches.
- C. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate.

3.8 DIRECTORIES

- A. Provide typed circuit directory cards in all panelboards (both breaker and fuse type) and low voltage lighting control panels indicating the room number or area, and the item or items controlled by each circuit. Provide typed circuit directory cards for all "Existing" panelboards and low voltage lighting control panels where the Contractor has added, deleted or moved circuits with in an "Existing" panelboard.
- B. Directories shall use actual room numbers to indicate locations of all devices, including, but not limited to receptacles, lighting, mechanical equipment, etc. When preparing schedule, use a room number schedule generated by the architect and/or the owner, which indicates the actual room numbers that will be used when the building is occupied. If the schedule is not available, request, in writing, a schedule to reflect the proper room numbers.
- C. Provide sufficient information to meet requirements of Article 408 of the National Electric Code.

3.9 ADDITIONAL FUSE LABELING

- A. At the exterior enclosure of all fused switches, provide additional labeling designating fuse sizes, types and quantity.

3.10 RECEPTACLE CIRCUIT IDENTIFICATION

- A. At each receptacle, identify panelboard and circuit number from which receptacle is served. Use machine printed, pressure sensitive, abrasion resistant label tape on backs of the wall plate and durable wire markers or tags within outlet boxes.

END OF SECTION 26 05 53

SECTION 26 26 16 – PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:
 - 1. Lighting and appliance branch circuit panelboards.
 - 2. Distribution panelboards.

1.2 DEFINITIONS

- A. GFCI: Ground fault circuit interrupter.

1.3 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and Manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. Bus configuration, current, and voltage ratings.
 - c. Short circuit current rating of panelboards and overcurrent protective devices.
 - d. UL listing for series rating of installed devices.
 - e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 2. Wiring Diagrams: Diagram power, signal, and control wiring and differentiate between Manufacturer installed and field installed wiring.
- C. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- D. Maintenance Data: For panelboards and components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Contract Closeout," 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.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

1.5 COORDINATION

- 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, and encumbrances to workspace clearance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Square D Company (preferred).
- B. Siemens.
- C. General Electric.
- D. Eaton (Cutler Hammer).
- E. No Other Manufacturers Will Be Considered.

2.2 FABRICATION AND FEATURES

- A. Enclosures: Flush and surface mounted cabinets. Refer to panel Schedules on Drawings to determine flush or surface. NEMA PB 1, Type 1 for interior locations and Type 3R for exterior locations, unless noted otherwise in the documents.
- B. Front: See panelboard, Hinged Trim Covers
- C. Finish: Manufacturer's standard enamel finish over corrosion resistant treatment or primer coat.
- D. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.
- E. Bus Material (Main, Neutral & Ground): Hard drawn copper, 98 percent conductivity.
- F. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.
- G. Equipment Ground Bus: Adequate for feeder and branch circuit equipment ground conductors; bonded to box.

- H. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches. Provide when indicated on the panel Schedules.
- I. Skirt for Surface Mounted Panelboards: Provide skirts with same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor. Skirts shall be provided for all surface mounted panels in all rooms with exception of rooms labeled on plans "Electric or Mechanical".
- J. Feed through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

2.3 PANELBOARD SHORT CIRCUIT RATING

- A. Panelboards shall be fully rated to interrupt symmetrical short circuit current as indicated on the schedules. All breakers within panelboards shall be fully rated to the panel AIC rating. Series ratings of branch breakers or bus shall not be acceptable.

2.4 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: See Panelboard Hinged Trim Covers

2.5 DISTRIBUTION PANELBOARDS

- A. Doors: Front mounted secured with latch and lock; keyed alike.
- B. Main Overcurrent Protective Devices: Circuit breaker or Main Lugs Only. Refer to panel Schedule.
- C. Branch Overcurrent Protective Devices: Bolt on circuit breakers.
- D. Provide Branch Feeder Metering Devices. Refer to Power Riser Diagrams and Panel Schedules for catalog numbers, quantities and size of metering devices.

2.6 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.
 - 1. Thermal Magnetic Circuit Breakers: Inverse time current 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.
 - 2. GFCI Circuit Breakers: Single pole configurations with 5mA trip sensitivity.
- B. Molded Case Circuit Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.
 - 1. Lugs: Mechanical style, suitable for number, size, trip ratings, and material of conductors.

2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air conditioning, and refrigerating equipment.
3. Ground Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time delay settings, push to test feature, and ground fault indicator.
4. Shunt Trip: 120 V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.

2.7 ARC ENERGY REDUCTION

- A. For any circuit breaker rated for 1200A, or can be adjusted to 1200A or higher, an electronic circuit breaker must be used, and the following shall be provided:
 1. Documentation shall be made available, at the switchboard, regarding the Arc Energy Reduction methodology.
 2. The applicable breaker shall be provided with an energy-reducing maintenance switch setting with local status indicator.

2.8 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: To test functions of solid state trip devices without removal from panelboard.
- C. Provide top and bottom panel skirts for all surface mounted lighting and power panels.

2.9 HINGED TRIM COVERS

- A. Provide Hinged Trim Panelboard covers for lighting and power panelboards. Entire Trim Hinged to one side of the box with a piano type hinge to access panel gutter space. Front door of panel shall be keyed to lock.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1
- B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.
- C. Mounting: Plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- D. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable. Refer to Section 260553 for more information.
- E. Install filler plates in unused spaces.

- F. Provision for Future Circuits at Flush Panelboards: Stub four 1 inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub two 1 inch empty conduits below slab not on grade into suspended ceiling cavity.
- G. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

- A. Provide panel and circuit identification as outlined in Division 26 "Electrical Identification".

3.3 CONNECTIONS

- A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.
- B. Tighten electrical connectors and terminals according to Manufacturers' published torque tightening values. If Manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Test continuity of each circuit.
- B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded case circuit breakers. 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.
- C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load balancing circuit changes outside normal occupancy/working Schedule of the facility and at time directed. Avoid disrupting critical 24 hour services such as fax machines and on line data processing, computing, transmitting, and receiving equipment.
 - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference exceeding 10 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.5 PROTECTIVE SHIELDS

- A. Provide metal protective shield(s) under all piping located within 3'-0" of the panelboard to deflect a pipe leak away from the electrical equipment. Shield(s) shall be sized as required to cover the required pipe to prevent water from reaching the panelboard.

3.6 ADJUSTING

- A. Set field adjustable switches and circuit breaker trip ranges.

3.7 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 26 26 16

SECTION 26 27 26 – WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes Lutron wireless dimming components, receptacles, connectors, switches, and finish plates.

1.2 DEFINITIONS

- A. GFCI: Ground fault circuit interrupter.

1.3 SUBMITTALS

- A. Product Data: For each product specified.
- B. Shop Drawings:
 - 1. Legends for receptacles and switch plates, where indicated on the drawings.
 - 2. Provide Occupancy Sensor catalog literature including performance specifications indicating compliance to the specifications.
- C. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NEMA WD 1.
- C. Comply with NFPA 70.
- D. Compliance with Federal Specifications – identified by the federal specifications mark (capital letters 'F' and 'S' each in a wing on either side of the UL Listing mark):
 - 1. Receptacles and GFCI's: Federal Specification number WC596.
 - 2. Switches: Federal Specification number WS896.

1.5 COORDINATION

- A. Receptacles for Owner Furnished Equipment, or Equipment furnished by other trades: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

A. Manufacturers

1. Hubbell HBL1221 Series.
2. Leviton 1221-2 Series.
3. Pass & Seymour PS20AC1 Series.
4. Arrow Hart (Cooper) AH1221 Series.

B. Description: NEMA WD 1, heavy duty industrial grade, binding screw type for back and side wiring, AC only snap switch with grounded mounting strap, and grounding terminal with green screw.

C. Toggle Color: As selected by Architect.

D. Types: Switch shall be single pole, double pole, three-way, or 4-way, as required by the drawings.

E. Voltage Rating: 120/277 volts, AC.

F. Current Rating: 20 amperes.

G. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded.

2.2 LUTRON PICO WIRELESS CONTROL SYSTEM

A. Manufacturers

1. **Lutron.**

B. Products

1. Listed products by application shall be **Lutron** product numbers. No other manufacturer will be acceptable.

Wireless Occupancy Sensor: LRF2-OCR2B-P-WH

Wireless Day Light Sensor: LRF2-DCRB-WH

Power Pak: RMJS-8TN-DV-B

PICO, Remote 3- Button Dimmer Device: PJ2-3BRL-GWH-LO1/CW-1-WH-E

2.3 RECEPTACLES

A. Duplex Convenience Receptacle

1. Manufacturers

- a. Hubbell HBL5362 Series.
- b. Leviton 5362 Series.

- c. Pass & Seymour PS5362 Series.
 - d. Arrow Hart (Cooper) AH5362 Series.
 - 2. Description: Heavy-Duty Federal Industrial Spec Grade with nylon face (smooth), brass strap, brass contacts for side and back wiring, and nylon base.
 - 3. Provide with WR (weather resistant) label when installed in exterior applications per code.
 - 4. Where indicated on the drawings, or per current version of NEC, provide the tamper resistant version with internal shutter system.
 - 5. Color of receptacles shall be as selected by the Architect.
 - 6. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded. Provide similar to Pass & Seymour "Plug Tail" type receptacles.
- B. Tamper Resistant Duplex Convenience Receptacle**
- 1. Manufacturers
 - a. Hubbell HBL5362TR Series.
 - b. Leviton 5362-SG Series.
 - c. Pass & Seymour TR63 Series.
 - d. Arrow Hart (Cooper) TR5362 Series.
 - 2. Description: Heavy-Duty Federal Industrial Spec Grade tamper resistant with nylon face (smooth), brass strap, brass contacts for side and back wiring, and nylon base.
 - 3. Provide with WR (weather resistant) label when installed in exterior applications per code.
 - 4. Provide the tamper resistant with internal shutter system.
 - 5. Color of receptacles shall be as selected by the Architect.
 - 6. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded. Provide similar to Pass & Seymour "Plug Tail" type receptacles.
- C. Tamper Resistant Duplex USB Charger Receptacle (1 type A, 1 type C)**
- 1. Manufacturers
 - a. Hubbell USB8300AC5 Series.
 - b. Leviton T5833-HG Series.
 - c. Pass & Seymour TR20HUSBAC6 Series.
 - 2. Description: Hospital Grade tamper resistant with high-impact resistant thermo plastic construction.
 - 3. Provide with WR (weather resistant) label when installed in exterior applications.
 - 4. Provide the tamper resistant with internal shutter system.
 - 5. Provide with two USB ports, (1) shall be type A, and the other shall be type C.
 - 6. USB charging shall comply with USB BC1.2 battery charging and 3.0 power delivery specifications.
 - 7. USB charging shall supply minimum 5 amp.
 - 8. Color of receptacles shall be as selected by the Architect.
 - 9. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded. Provide similar to Pass & Seymour "Plug Tail" type receptacles.

D. Tamper Resistant Duplex USB Charger Receptacle (2-type A)

1. Manufacturers
 - a. Hubbell USB8300A5 Series.
 - b. Leviton T5832-HG Series.
 - c. Pass & Seymour TR8300HUSB Series.
2. Description: Hospital Grade tamper resistant with high-impact resistant thermo plastic construction.
3. Provide with WR (weather resistant) label when installed in exterior applications.
4. Provide the tamper resistant with internal shutter system.
5. Provide with two (2) USB type A ports.
6. USB charging shall comply with USB BC1.2 battery charging and 3.0 power delivery specifications.
7. USB charging shall supply minimum 5 amp.
8. Color of receptacles shall be as selected by the Architect.
9. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded. Provide similar to Pass & Seymour "Plug Tail" type receptacles.

E. Tamper Resistant Ground Fault Circuit Interrupter (GFCI) Receptacle

1. Manufacturers
 - a. Hubbell GFTR20 Series.
 - b. Leviton X7899 Series.
 - c. Pass & Seymour 2095TR Series.
 - d. Arrow Hart (Cooper) TRVGF20
2. Description: Federal Specification Grade tamper resistant with high-impact-resistant thermoplastic construction, brass contacts for side and back wiring and LED trip indicator light.
3. GFCI receptacles shall not be connected to protect downstream devices, unless noted otherwise on the drawings. Provide unit designed for installation in a 2-3/4" deep outlet box without adapter, grounding type, Class A, Group 1, per UL 943.
4. Device shall comply with Federal Specification WC596. Devices shall have protection so that if critical components are damaged and ground fault protection is lost, power to receptacle shall be disconnected.
5. Provide with WR (weather resistant) label when installed in exterior applications per code.
6. Provide tamper resistant with internal shutter system.
7. Prewired and plug-in devices shall be acceptable provided device matches specifications and plug-in devices are crimped and welded.

F. Weatherproof Receptacle

1. Consisting of a GFCI receptacle as specified above in an outlet enclosure that is UL listed for wet locations, and meet NEC and OSHA requirements while in use.
 - a. Exterior-mounted receptacles **installed in existing walls and on mechanical units** shall have a self-closing weatherproof (in use) cover similar to Pass & Seymour WIUC series. Exterior-mounted receptacles **installed in new walls** shall have a self-closing weatherproof (in use) and be mounted over a recessed box similar to Arlington Industries DSBVR1W series. Paint cover to match adjacent surface with appropriate type of paint. Coordinate color with Architect prior to ordering.

2.4 SPECIAL PURPOSE RECEPTACLES

A. Manufacturers

1. Hubbell.
2. Leviton.
3. Pass & Seymour.
4. Arrow Hart (Cooper).

B. Description: Polarized, grounding type

C. Device Body: Black nylon

D. Configuration: As required by the amperage and voltage of the equipment to be connected on the drawings.

E. Provide equipment cord and caps as required for equipment.

2.5 WIRING DEVICE ACCESSORIES

A. Wall Plates: Provide wall plates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates.

B. Wall Plates: Provide 302 satin finished stainless steel wall plates throughout the building.

C. Provide galvanized steel wall plates in unfinished spaces.

2.6 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber insulated, stranded copper conductors, with type SOW A jacket. Green insulated grounding conductor, and equipment rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable clamping jaws. Match cord and receptacle type for connection.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.
- B. Verify all receptacle mounting heights before roughing in unless noted. If an outlet is installed in such a location as to be out of proper relation to beams, walls, or finish details of the building, its location shall be corrected by and at the expense of the Contractor under direction of the Architect/Engineer.
- C. Install devices and assemblies plumb and secure only in electrical boxes which have been cleaned of excess building materials, dirt, and debris. Device to be secure tight against wall box and flush with wall plate.
- D. Install switches on latch side of doorways.
- E. Install wall plates when painting is complete.
- F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- G. Protect devices and assemblies during painting.
- H. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.
- I. Analog Dimmers: Provide the required low and/or line voltage wiring shall be provided to control the fixture. Any and all additional accessories required, including power packs, shall be provided in their entirety.
- J. Install Occupancy Sensors to meet the following requirements. Locations indicated on the plans are diagrammatical, and do not necessary represent the optimal placement of sensors.
 - 1. Sensor is activated within half step into room.
 - 2. If person walks past open door, but not into room, sensor does not activate.
 - 3. Contractor shall be responsible to reposition any sensor where the above is not accurate.
 - 4. Occupancy Sensors shall be provided with minimum 10' additional wiring to allow repositioning of the sensor after the fact for poorly positioned sensors. Extra wire shall be coiled and supported adjacent to the power pack.
 - 5. Provide label on ceiling grid for location of occupancy sensor power pack above ceiling.

3.2 INSTALLATION TO MEET ACOUSTICAL PERFORMANCE

- A. In order to reduce sound transmission through walls, when devices boxes are installed to serve both sides of the wall, they shall be installed in different stud cavities. Where boxes are found to be installed in the same stud cavity, feeding two different sides of the wall, they will be required to be removed and reinstalled at the contractor's expense.

3.3 IDENTIFICATION

- A. The requirements listed below are in addition to the requirements listed in Division 26 "Electrical Identification".
- B. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
- C. Receptacles: Identify panelboard and circuit number from which served. Use machine printed, pressure sensitive, abrasion resistant label tape on backside of the wallface plate and durable wire markers or tags within outlet boxes.

3.4 CONNECTIONS

- A. Connect wiring device grounding terminal to outlet box with bonding jumper.
- B. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- C. Tighten electrical connectors and terminals according to manufacturers published torque tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

- A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.
- B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- C. Replace damaged or defective components.

3.6 CLEANING

- A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 26 27 26

SECTION 26 28 13 – FUSES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes cartridge fuses, rated 600 V and less, for use in switches, panelboards, switchboards, controllers, and motor control centers; and spare fuse cabinets.

1.2 SUBMITTALS

- A. Product Data: Include dimensions and Manufacturer's technical data on features, performance, electrical characteristics, and ratings for each fuse type indicated.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Provide fuses from a single Manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NEMA FU 1.
- D. Comply with NFPA 70.

1.4 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply Manufacturer's ambient temperature adjustment factors to fuse ratings.

1.5 COORDINATION

- A. Coordinate fuse ratings with HVAC and refrigeration equipment nameplate limitations of maximum fuse size.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged in original cartons or containers and identified with labels describing contents.
 - 1. Fuses: Quantity equal to one (1) set for every five (5) installed sets, but not fewer than one set of three of each kind.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Industries, Inc.; Busmann Div.
 - 2. General Electric Co.; Wiring Devices Div.
 - 3. Mersen (Ferraz Shawmut).
 - 4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Main Service: Class L, time delay (601 to 6000A) or Class J, time delay (0 to 600A).
- B. Main Feeders: Class L, time delay (601 to 6000A) or Class J, time delay (0 to 600A).
- C. Combination Starter/Disconnect Switches: Class RK5, time delay.
- D. Disconnect Switches: Class RK5, time delay (30-600A).
- E. Other Branch Circuits: Class RK5, time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

- A. The requirements listed below are in addition to the requirements listed in Division 26 "Electrical Identification".
- B. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 26 28 13

SECTION 26 28 16 – DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Disconnect switches.
- B. Enclosures.

1.2 REFERENCES

- A. FS W F 870 Fuseholders (For Enclosed Cartridge Fuses).
- B. FS W S 865 Switch, Box, (Enclosed), Surface Mounted.
- C. NEMA KS 1 Enclosed Switches.

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 26 00 10.
- B. Include outline Drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Square D Company (preferred).
- B. Siemens.
- C. Eaton (Cutler Hammer).
- D. General Electric.
- E. No Other Manufacturers will be considered.

2.2 HEAVY DUTY TYPE

- A. All switches shall have switch blades which are visible when the switch is OFF and the cover is open.
- B. Lugs shall be front removable and UL listed for 60°C or 75°C conductors in switches rated 30 100 ampere, 75°C conductors in switches rated 200 1200 ampere, copper conductors.
- C. All current carrying parts shall be plated to resist corrosion.

- D. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.
- E. Switches shall have provisions for a field installable electrical interlock.
- F. Switch operating mechanism shall be quick make, quick break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started.
- G. The operating handle shall be an integral part of the box, not the cover.
- H. The handle position shall travel at least 90 degrees between OFF and ON positions to clearly distinguish and indicate handle position.
- I. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is ON and prevent turning the switch ON when the cover is open. The cover interlock mechanism shall have an externally operated override but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- J. Switch enclosure shall be NEMA 1 unless otherwise on the Drawings or required by the NEC in accordance with the project conditions.
- K. The enclosure shall be finished with Gray baked enamel paint which is electrodeposited on cleaned, phosphate pre treated steel (Type 1), or Gray baked enamel paint which is electrodeposited on cleaned, phosphate pre treated galvanized steel (Type 3R).
- L. The enclosure shall have ON and OFF markings on the cover to clearly identify the position of the switch.
- M. All switches shall have provisions to lock the operating handle in the OFF position.
- N. Tangential knockouts shall be provided to facilitate ease of conduit entry for switches rated 30 200A.
- O. Enclosures for Type 3R switches through 200 ampere shall have provisions for interchangeable bolt on hubs in the top endwall.
- P. Switches shall be horsepower rated for ac and/or dc as indicated on the plans.
- Q. The UL listed short circuit current rating of the switches shall be: 200,000 rms symmetrical amperes when used with or protected by Class R fuses (30 600 ampere switches employing appropriate fuse rejection schemes).

2.3 SWITCH ACCESSORIES

- A. Where switches are designated to be used as service entrance, the switch shall be labeled for such use.
- B. Where fused switches are designated to have type "R" fuses, the switch shall be provided with rejection clips.
- C. Provide fuse clip adaptors as required to accommodate smaller fuses when required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install disconnect switches to meet N.E.C. working clearance requirements.
- B. Install fuses in fusible disconnect switches.

3.2 IDENTIFICATION

- A. The requirements listed below are in addition to the requirements listed in Division 26 "Electrical Identification".
- B. Provide labeling on the exterior of each disconnect switch Stating the following:
 - 1. What the piece of equipment is fed from the switch.
 - 2. Where the piece of equipment is fed from the switch.
 - 3. Size, type and quantity of fuses within cabinet.

3.3 FIELD QUALITY CONTROL

- A. Subsequent to completion of installation of disconnects, energize circuits and demonstrate capability and compliance with requirements. Demonstrate switch operation through six (6) opening/closing cycles with circuit unloaded. Open each switch enclosure to display interior, mechanical and electrical connections and fuse installation, and for verification of type and rating of fuses installed. Where possible, correct deficiencies at project site, then retest or demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION 26 28 16

SECTION 26 51 00 – LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes interior lighting fixtures, lighting fixtures mounted on exterior building surfaces, lamps, ballasts, emergency lighting units, and accessories.

1.2 SUBMITTALS

- A. Product Data: For each type of lighting fixture indicated, provide typical cutsheets. Include data on features, accessories, and the following:
 - 1. Light output in lumens, color temperature (CCT), color rendering index (CRI) and energy efficiency data.
 - 2. Lighting fixture accessories.
 - 3. Dimensions of fixtures.
- B. Coordination: The electrical contractor shall be responsible to coordinate all light fixtures with ceiling installer before installation of ceiling grid. The electrical contractor shall also coordinate light fixture installation with HVAC and plumbing contractor for installation of piping and ductwork. Should there be any conflicts, they should be brought to the attention of the architect/engineer prior to the installation of the ceiling grid. Any conflicts not brought to the attention of the architect/engineer before installation of ceiling, the electrical contractor shall bare all costs associated with rework to install light fixtures, piping, ductwork, ceiling grid, etc.

1.3 QUALITY ASSURANCE

- A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NFPA 70.
- C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.4 COORDINATION

- A. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide from manufacturers as specified in the Lighting Fixture Schedules or on the drawings.

2.2 FIXTURES AND FIXTURE COMPONENTS, GENERAL

- A. Metal Parts: Free from burrs, sharp corners, and edges.
- B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- D. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.
- E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or annealed crystal glass, unless otherwise indicated.
 - 1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and ultraviolet radiation.
 - 2. Lens Thickness: 0.156 inch minimum, unless greater thickness is indicated.

2.3 LED DRIVERS

- A. Provide low-energy LED drivers, capable of operating the LEDs indicated. Drivers shall operate at an input voltage between 120 to 277 VAC at an input frequency of 60 Hz +/- 10%. Light output shall remain constant for line voltage fluctuations within the range described. Drivers shall comply with EMI and RFI limits set by the FCC (CFR 41 Part 18) for non-residential applications and not interfere with normal electrical equipment. Drivers shall meet applicable ANSI standards and must be UL listed with the fixtures. Drivers shall provide 0-10V dimming operation, unless noted otherwise.
 - 1. Where fixtures are connected to a switching device on the drawings, the 0-10V terminations shall remain unconnected.
- B. Compatibility: Certified by manufacturer for use with specific dimming system indicated for use with each dimming ballast.

2.4 EXIT SIGNS

- A. General Requirements: Comply with UL 924 and the following:
 - 1. Sign Colors and Lettering Size: Comply with authorities having jurisdiction.
 - 2. Internally Lighted Signs: As follows:
 - a. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum rated lamp life.

2.5 LAMPS

- A. LED lamps shall comply with the LM-79 and LM-80 standards and be provided to meet the following minimum specifications:
 - 1. Recessed 1'x4', 2'x2' and 2'x4' fixtures: minimum 50,000 hours at 70% lumen output.
 - 2. Recessed downlights: minimum 50,000 hours at 70% lumen output.
 - 3. Linear pendant fixtures: minimum 70,000 hours at 80% lumen output.

2.6 FIXTURE SUPPORT COMPONENTS

- A. Single-Stem Hangers: ½-inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.
- B. Twin-Stem Hangers: Two, ½-inch steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.
- C. Rod Hangers: 3/16-inch- minimum diameter, cadmium-plated, threaded steel rod.
- D. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- E. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.
- F. Independent Support Anchors: Anchors shall be on every fixture at the four (4) opposite corners. The contractor is required to independently support all recessed 1'x4', 2'x2', 2'x4', 4'x4', 2' diameter or larger fixture from all four corners. Circular fixtures smaller than 2' diameter, linear slot fixtures, etc. shall be support from at least two (2) opposite corners. Provide additional supports as recommended by the manufacturer.
- G. Ceiling support steel for light fixtures: Support steel (unistrut) shall be installed to provide additional support for light fixtures from ceiling grid. Unistrut shall be installed above ceiling grid T-bars where the weight of the light fixtures requires additional ceiling supports. Unistrut shall be supported independently from ceiling system.

2.7 FINISHES

- A. Fixtures: Manufacturer's standard, unless otherwise indicated.
- B. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
- C. Metallic Finish: Corrosion resistant.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.

- B. Support for Fixtures in or on Grid-Type Suspended Ceilings. Fixtures shall be independently supported from building structure from all four corners of recessed fixtures including 2x4, 1x4, 2x2, 4x4, etc. and from opposite corners from recessed downlight and 1x1 fixtures to building steel. Wire shall be galvanized steel and rated for fixture, but not less than 14 gauge. Braided wire shall be acceptable.
- C. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
- D. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- E. Suspended Fixture Support: As follows:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Chain Hung: Suspend with jack chain from structure.
 - 4. Continuous Rows: Suspend from cable installed according to fixture manufacturer's written instructions and details on Drawings.
- F. Light fixtures shall be installed over junction boxes so they can be removed at a later date to access the wiring in the junction box.
- G. Where digital or analog dimming devices are indicated to control light fixtures, the required low and/or line voltage wiring shall be provided to control the fixture. Any and all additional accessories required shall be provided in their entirety.

3.2 CONNECTIONS

- A. Ground equipment.
- B. Furnish and install code compliant fixture disconnecting devices.
- C. 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 and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Tests: As follows:
 - 1. Verify normal operation of each fixture after installation.
 - a. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
- C. Corrosive Fixtures: Replace during warranty period.

3.4 CLEANING AND ADJUSTING

- A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.
- B. Adjust aimable fixtures to provide required light intensities. Inform Architect/Engineer when aiming fixtures.

END OF SECTION 26 51 00