



DIVISION 21

1. Page 119, Section 101; Delete Paragraph C in its entirety and insert the following:

“C. A current fire hydrant flow test shall be required anytime a new fire suppression system is part of a project. For stand-alone fire suppression retrofit projects, a current flow test shall be completed as part of the performance specification to determine adequacy of the water supply without the use of fire pumps, if at all possible. The hydrant flow test shall be conducted at a maximum flow from a hydrant as close to the proposed system as possible. A minimum of two-2.5 outlets should be flowed, then static & residual reading recorded. If possible standard play pipes should be at-tached to the 2.5 inch outlets with the brass nozzle tip removed so readings are taken from the 1.75 inch nozzle outlet. It is possible a pumper outlet (~4”) is the only outlet to be flowed. The sprinkler contractor shall be accountable to verify the water test is accurate so their designs and provide a minimum safety factor in all calculations. Minimum required data for each fire flow test shall include the following:”

2. Page 120, Section 102; Delete Paragraph A in its entirety and insert the following:

“A. STEEL PIPE AND FITTINGS

1. Fire Sprinkler piping NPS 1-1/4 or smaller shall be Schedule 40 blacksteel and may be joined by either threaded fittings, or welding. Fire sprinkler piping larger than NPS 1-1/4 shall be Schedule 10 and shall be joined by grooved coupling fittings. All grooved coupling fittings shall be Victalulic brand, domestically-manufactured 73-009N FireLock EZ type fittings. Grooves for all piping shall be machine-rolled, not cut. Where piping is welded, all welds shall be primer coated. Flex drops must have 2 inch minimum bend radius. All pipe and fittings shall be domestically manufactured.
2. All piping installations shall be hydrostatically tested at 1.5 times tested residual pressure for a period of 12 hours. Provide documentation of testing.”

3. Page 120, Section 102; Delete C, 1 in its entirety and insert the following:

“1. Water service to each building shall occur within 6-feet of the building perimeter in accordance with NFPA 24 and be located in an equipment or mechanical room. Water service into each building shall utilize a one piece stainless steel riser (Ames IBR or equivalent) capable of extending beyond the foundation of each building. Riser inlet coupling shall be AWWA C900 and riser outlet shall be AWWA C606 grooved. No connections are permitted under the slab. Thurst blocking shall be included to meet or exceed requirements in NFPA 24 and the manufacturer’s recommendations.”

4. Page 120, Section 102, C, 2; Revise “systems” to read as follows: “systems”.



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5. Page 120, Section 102, C, 2; Delete detail in its entirety and insert revised detail.

6. Page 121, Section 102, D, 1; Insert the following after “color scheme”: “; only factory painting of cover plates is permissible.”

7. Page 121, Section 102, D, 3; Insert the following after “Where possible, use”; “freeze-proof”.

8. Page 121, Section 102, D; Insert the following Sub-Paragraph:

“4. Flexible fire sprinkler drops are allowable but must meet UL-listed requirements for 2” minimum bend radius and number of allowable bends of the FlexHead® or Victaulic® brands. “

9. Page 121, Section 102, E; Insert the following Sub-Paragraph:

“2. Coordinate design and operation of these systems with main fire detection and suppression systems.

3. Dry pipe and pre-action systems shall be Schedule 40 black steel, grooved-coupling pressurized with nitrogen using nitrogen generators. These systems shall be monitored with nitrogen concentrations controlled by automatic purge controls.

4. Dry pipe and pre-action system risers shall be located in riser rooms if possible.”



10. Page 122, Section 102, F; After “1” insert the following: “Standpipe systems shall be avoided if at all possible in TCC buildings. When avoidable” and adjust subsequent capitalizations accordingly.
11. Page 122, Section 102, G, 1; Delete “increase pressure drop” and insert the following: “decrease pressure drop”.
12. Page 123, Section 102, I, 1; Delete “installed horizontally, to provide ease of maintenance” and insert the following: “shall be Watts 757 OS&Y double check. Install backflow preventers in fire riser room, avoid installation in vaults.”
13. Page 123, Section 102, I, 4; Insert “Riser” immediately before “signage” and adjust subsequent capitalization accordingly.
14. Page 123, Section 102, I, 4, a; Delete Sub-Paragraph I, 4, a in its entirety and insert the following:
 - a. Site/Floor plan with label indicating which area of the building the riser serves.
 - b. Shut-off valve location.
 - c. Main Riser – identification of attached antifreeze, dry, pre-action and auxillary systems.
 - d. Anti-freeze system design information.”



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1. Page 125, Section 102; Delete Sub-Paragraphs A, 1, a through d in their entirety.
2. Page 125, Section 102; Delete Sub-Paragraph A, 2 in its entirety.
3. Page 125, Section 102; Delete Sub-Paragraphs A, 3, a through h in their entirety.
4. Page 126, Section 102; Delete Sub-Paragraphs A, 4, a through d in their entirety.
5. Page 126, Section 102; Delete Sub-Paragraphs A, 5, a through d in their entirety.
6. Page 126, Section 102; Delete Sub-Paragraph A, 6, a in it's entirety.
7. Page 126, Section 102; Delete Sub-Paragraphs A, 7, a through c in their entirety.
8. Page 126, Section 102; Delete Sub-Paragraphs A, 8, a through c in their entirety.
9. Page 126, Section 102; Delete Sub-Paragraphs A, 9, a and b in their entirety.
10. Page 126, Section 102; Delete Sub-Paragraph A, 10 in its entirety and renumber subsequent Sub-Paragraphs.
11. Page 127, Section 102; Delete Sub-Paragraphs A, 12, a through c in their entirety.
12. Page 127, Section 102; Delete Sub-Paragraph A, 13, a in its entirety.
13. Page 127, Section 102; Delete Sub-Paragrapha A, 14, a and b in their entirety.
14. Page 127, Section 102; Delete Sub-Paragrapha A, 15, a and b in their entirety.
15. Page 127, Section 102; Delete Sub-Paragraphs A, 16, a through d in their entirety.
16. Page 127, Section 102; Delete Sub-Paragraph A, 17, a in its entirety.
17. Page 127, Section 102; Delete Sub-Paragraph A, 18, a in its entirety.
18. Page 128, Section 102, A, 23, b, 1); Insert the following after "Sensus Omni C²": "(for irrigation and blow-down applications)"
19. Page 128, Section 102, A, 23, b, 2); Insert the following after "Mastermeter Octave": "(for clean water applications)"
20. Page 128, Section 103, A, 1, a, 1); Add the following: "In pipe-bursting applications, HDPE piping rated for sanitary sewer use, equivalent to Driscoplex® 4000/4100 shall be used."



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21. Page 129, Section 103; Delete Sub-Paragraph C, 2, c in its entirety and insert the following:
 - "c. Piping larger than six (6) inch diameter: Consult with TCCD before making selection."
22. Page 129, Section 103, E, 1; Delete "L" after "Provide Type" and insert "K".
23. Page 130, Section 103, K; Delete "Fuel Oil Piping is designed specific" and insert the following: "TCCD's preferred fueling method for emergency generators and boilers is natural gas."
24. Page 130, Section 104, A; Delete "Prefer" and insert the following: "shall be".
25. Page 131, Section 104, A, 1, k; After "Provide Leonard 270LF" insert the following: "or Zurn".
26. Page 131, Section 104, A, 1, k; After "emergency showers and eyewashes" insert the following: ", where applicable."
27. Page 132, Section 104; Delete Sub-Paragraph B, 1 in its entirety and insert the following:
 - "1. Provide turbine type cold domestic water meter. Meter register shall be digital, indicating gallons. Specify with a dual digital output BAS interface, remote readout register and necessary wiring and accessories. Connect pulse readout point to both the campus WAGES, the Utility Monitoring System and campus BAS."
28. Page 132, Section 104, B, 2; Revise "house bibs" to read as follows: "house bibbs".
29. Page 132, Section 104, C, 1; Delete "Connect monitored points to campus WAGES the Utility Monitoring System." and insert the following: "Connect monitored points to the WAGES Utility Monitoring System and campus BAS."
30. Page 132, Section 104, D, 2; Delete "cast iron strainer" after 125 lb." and insert the following: "epoxy coated strainer (Watts 77F-DI-FDA-125 or equal)".
31. Page 132, Section 104, D, 4; Delete "the crawl space." and insert the following: "crawl spaces."
32. Page 132, Section 104, E, 1; Delete "Preset System Inc. trap guard."
33. Page 132, Section 104, E, 2; Delete "Jay R. Smith #2005Y & #A05NB, or Jay R. Smith #205L & #A05NB."
34. Page 134, Section 104; Delete Sub-Paragraph H, 1 in its entirety and insert the following:
 - "1. ACID NEUTRALIZATION BASIN: Zurn Z9A-NT or equal, properly sized for the waste stream. Supply and install sump with an initial complete neutralizing fill of 1" to 3" size range."
35. Page 134, Section 104; Delete Sub-Paragraph H, 3 in its entirety and renumber subsequent Sub-Paragraphs.
36. Page 134, Section 104, H, 4; Add the following: "Consult TCCD when the use of concealed emergency showers/eyewashes is desired."



37. Page 135, Section 104; Delete Sub-Paragraph H, 5 in its entirety and insert the following:
 - “4. Provide with flow switch, local alarm, alarm back to BAS and light indicating activation. and TCCD does not recommend installation of emergency shower thermostatic mixing valve to supply tepid water (80°F) to fixture.”
38. Page 135, Section 104, H, 6; Insert the following before “Provide drain pipe”: “ For eyewash stations,” and adjust capitalizations accordingly.
39. Page 136, Section 105, B, 1, a, 1); Delete “Sloan #ST-2059A” and insert the following: “Sloan #ST-2459”.
40. Page 136, Section 105, Delete Sub-Paragraphs B, 1, b, 1 and 2 in their entirety, and renumber the subsequent Sub-Paragraphs.
41. Page 136, Section 105, ; Delete Sub-Paragraphs B, 2, b 1 and 2 in their entirety, and renumber the subsequent Sub-Paragraphs.
42. Page 137, Section 105, B, 6; Revise “ACCESS” to read as follows: “ACCESSIBLE”.
43. Page 138, Section 105, B, 7, b, 5); Add the following: “Break Room/Kitchen Sink faucets shall be Elkay LKHA4031 Chrome.”
44. Page 138, Section 105, B, 8; Add the following: “The recessed configuration is preferable to TCCD.”
45. Page 139, Section 105, B, 12, a; Add the following: “Consult TCCD for use of thermostatic mixing valve before specifying.”
46. Page 139, Section 105, C, 1; Delete “tanks or kits on all Aerco Innovations and boilers” and insert the following: “basins per Section 1.04.H”.
47. Page 139, Section 105, C; Insert the following Sub-Paragraph and renumber subsequent paragraphs:
 - “1. TCCD desires to use non-centralized domestic hot water production where there is currently no centralized system. Non-centralized production of domestic water may use electric, natural gas or heat pump production means but the means selected shall be justified by life cycle cost analysis of all three system alternatives.”
48. Page 140, Section 105, D; Insert the following Sub-Paragraph:
 - “b. Pumps shall be controlled via BIAS.”
49. Page 140, Section 106, F; Delete “up” and insert the following: “for depths down”.
50. Page 141, Section 106; Delete Paragraph J in its entirety and insert the following:
 - “J. Install water hammer arresters (PPP, Jay R. Smith or equal) complete with accessible isolate valve hot and cold water lines between the next to last and the last fixture in a battery of plumbing fixtures, and at each plumbing fixture located remote from a battery of fixtures, at fixtures using quick close valves and as code required. Size in accordance with PDI WH-201.”



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- 51. Page 141, Section 106, N, 2; Delete “BERMAND” and revise to read: “BERDMAD”.
- 52. Page 142, Section 106, R; Add the following: “Provide hose bibb drains on domestic hot and cold water mains.”
- 53. Page 142, Section 106; Insert the following Paragraphs:
 - “AH. Specify that smoke test be performed on all renovation plumbing sanitary sewer/vent systems.
 - AI. Disinfect domestic water systems per code requirement verified by third-party testing.
 - AJ. TCCD Science labs require non-potable domestic cold and hot water loops to supply all fixtures except eyewash/emergency showers properly backflow protected. Lab domestic hot water loops shall derive from central or building level potable domestic hot water supplies where possible and shall have electric or heat pump booster water heaters to maintain loop temperature.”

54. Page 142, Section 107, A; Insert the following table:

SERVICE	BAND	LETTERS/ARROWS	LEGEND
Domestic cold water (potable)	Lt. Blue	White	DCW
Domestic hot water	Orange	White	DHW
Domestic hot water return	Orange	White	DHWR
Fire protection water	Red	White	FIRE
Condenser water supply	Brown	White	CWS
Condenser water return	Brown	White	CWS
Primary chilled water supply	Dark Blue	White	PCHS
Primary chilled water return	Lt. Blue	White	PCHR
Secondary chilled water supply	Dark Blue	Black	SCHS
Secondary chilled water return	Lt. Blue	Black	SCHR
Primary heating hot water supply	Orange	White	PHWS
Primary heating hot water return	Orange	White	PHWR
Secondary heating hot water supply	Orange	Black	SHWS
Secondary heating hot water return	Orange	Black	SHWR
Lab waste ACID	Purple	Black	LAB WASTE
Lab vent ACID	Purple	Black	LAB VENT
Deionized water	Purple	Black	DI
Non-potable water	Purple	Black	NPW
Sanitary vent	Tan	White	VENT
Sanitary sewer	Brown	White	SS
Chemical feed	Purple	Black	CHEM FEED
Fuel oil	Forest Green	Black	FUEL OIL
Natural gas	Yellow	Black	NAT. GAS
Compressed Air	Lt. Blue	White	AIR
Vacuum	Lt. Gray	White	VAC

55. Page 142, Section 107, A; Delete “Refer to Division 23.”



DIVISION 23

1. Page 143, Section 103, A, 1, f; After “(OBD) insert the following: “blade dampers”.
2. Page 144, Section 103, A, 1, f; Insert “Size supply air devices with OBDs appropriately to achieve desirable sound levels.”
3. Page 144, Section 103, A, 2, a; Add the following:
“Where shallow plenum spaces prevent vertical drops from metal duct elbows to the supply diffuser, connect flex duct directly to supply diffusers using Thermaflex FlexFlow elbows.”
4. Page 144, Section 103, A, 3, a; After “and if the ductwork” delete “if” and insert “is”.
5. Page 144, Section 103, A, 3, c; Delete “Round” and insert the following: “Medium pressure round”.
6. Page 144, Section 103, A, 5, a; Delete the first sentence in its entirety and insert the following:
“Rectangular ductwork can either be internally lined (only where exposed) or externally wrapped (preferred).”
7. Page 144, Section 103, A, 5, a; Before “spiral round ductwork” insert “concealed”.
8. Page 145, Section 103, A, 7; Delete the last sentence in its entirety and insert the following:
“Manual dampers shall have a locking feature, an indicator showing the position or percent open of the damper blades and stand-offs to preserve duct insulation thickness beneath them.”
9. Page 146, Section 103, A, 8; Insert “Ductwork” to beginning of the sentence and adjust capitalizations accordingly.
10. Page 146, Section 103; Delete Sub-Paragraph B, 1, a in its entirety and insert the following:
“a. All chilled or heating water control valves on TCCD projects shall be Belimo valves as specified in the proprietary equipment section with Belimo MFT actuators. Belimo MFT actuators on Belimo ePIV valves shall have integral logic needed to optimize operation of Belimo “smart valves”. Belimo is a TCCD proprietary standard, substitutions are not acceptable. The design professional shall be responsible for coordinating the valve size and flow characteristics for each piece of equipment.”
11. Page 147, Section 103, B, 5, e; Before “hydronic pumps” insert “all”.
12. Page 147, Section 103, B, 5, e; Delete “for water balance to increase energy efficiency”.
13. Page 149, Section 103, C, 2, d; Insert “Avoid horizontal flue runs; provide separate flue for each boiler/water heater.” before the last sentence.
14. Page 152, Section 103, D, 5, PLUMBING AND MECHANICAL PIPING SYSTEMS LABELING; Delete “CWS” under “Condenser water supply” and insert “CWR”.
15. Page 152, Section 103, D, 5, PLUMBING AND MECHANICAL PIPING SYSTEMS LABELING; Delete “White”



16. Page 152, Section 103, D, 5, PLUMBING AND MECHANICAL PIPING SYSTEMS LABELING; Delete “White” under “Secondary chilled water return” and insert “Black”.
17. Page 152, Section 103, D, 6; Before “Pipe Identification” insert “Wrap-around or placard”.
18. Page 152, Section 103, D, 6; Before “plastic band type” insert “non-wrap-around”.
19. Page 153, Section 103, D, 7; Delete “Plastic band type identifies shall come with a minimum of two band type clamps.”
20. Page 153, Section 104, A, 5; Delete in its entirety and insert the following: “Provide common, manifolded acid neutralizer systems, not boiler-specific kits where possible.”
21. Page 154, Section 104, B, 1; Delete “to” after “JACI” and insert “/York”.
22. Page 154, Section 104, B, 3; Delete “vender provided remote starters mounted adjacent to”.
23. Page 154, Section 104, B, 4; Insert “via BacNET protocol” after “BAS”.
24. Page 154, Section 104, B; Insert the following Sub-Paragraph:
“6. Provide Life Cycle Cost Analysis of a minimum of three alternatives before selection.”
25. Page 154, Section 104, C, 4; Insert “via BacNET protocol” after “BAS”.
26. Page 154, Section 104, C, 6; Insert “6. Provide Life Cycle Cost Analysis.”
27. Page 155, Section 104, E, 1; Insert “or direct drive” after “gear-driven”.
28. Page 156, Section 104, E; Insert the following Sub-Paragraph:
“16. Life Cycle Cost Analysis shall be performed on a minimum of two alternatives including the use of direct drive permanent magnet motors.”
29. Page 156, Section 104, F, 1; Delete “Provide pumps with motors” and insert the following: “Provide in-line pumps (avoid couplings) with motors”.
30. Page 157, Section 104, G, 3; Delete “three (3) pound per cubic foot density neoprene coated glass fiber insulation” and insert the following: “foam insulation (R-13 minimum).”
31. Page 158, Section 104, G, 10; After “configured in a fan” delete “wall” and insert “array”.
32. Page 158, Section 104, G, 10; After “whether a return air fan” delete “wall” and insert “array”.



33. Page 158, Section 104; Delete Sub-Paragraph G, 15 in its entirety and insert the following:
 - “15. Filter housings to be manufactured by the air handling unit manufacturer with both 2” pre-filter racks and 4” filter racks, unless the project specific filtration requirements necessitate more stringent filtration. Provide access doors on each side of section. Provide gasketed galvanized steel filter blanks to prevent air bypass around filters. Filter arrangements to flat with a maximum of 450 feet per minute across filter area.”
34. Page 158, Section 104, G, 16; Delete “main filter sections to accommodate”.
35. Page 158, Section 104, G, 18; Delete “Dampers shall be Ruskin CD60 or equivalent.”
36. Page 159, Section 104, H, 1; Add the following: “Provide curb design/installation required to fully control compressor unloading and other equipment generated noise and vibration.”
37. Page 159, Section 104, I; Delete “WHEELS” and insert “RECOVERY UNITS”.
38. Page 160, Section 104, J, 3; Delete “3/4” and insert “1/2”.
39. Page 160, Section 104, K, 1; After “Provide ETI,” insert the following: “Titus or Price”.
40. Page 160, Section 104, K, 3; After “Parallel” insert the following: “and series”.
41. Page 160, Section 104, L; Insert the following Sub-Paragraphs and renumber subsequent Sub-Paragraphs:
 - “3. Incorporate 100% outside air supply/exhaust heat recovery.
 4. Provide low-flow fume hoods equipped with occupancy control.”
42. Page 161, Section 105, A, 3; Delete “hot”.
43. Page 162, Section 105, A, 16; Delete “3/4” and insert “1/2”.
44. Page 163, Section 105, C, 2; After “free-cooling system” insert the following: “or plate-and-frame heat exchanger system”.
45. Page 163, Section 104, D,1; Insert “Provide life cycle cost analysis for a minimum of three different boiler or plant configuration” to end of sentence.
46. Page 164, Section 104, E, 2; Delete “base-mounted end suction” and insert “in-line”.
47. Page 164, Section 104, E, 3; Delete “base-mounted end suction” and insert “in-line”.
48. Page 165, Section 104, E, 5; Delete in its entirety and renumber subsequent sections.
49. Page 166, Section 104, L,1; Delete “feasible” and insert “preferable”.



DIVISION 24

1. Page 173, Section 101, C; Delete first sentence in its entirety and insert the following:
“C. The design professional and TCCD shall meet to determine if commissioning by a third part, Cx firm will be part of the project and establish the level of involvement of the Cx firm.”
2. Page 173, Section 102; Insert the following Paragraphs and renumber subsequent Paragraphs:
“A. ASHRAE Standard 202-2018 – Commissioning Process for Buildings and Systems.
B. ASHRAE Guideline 0-2019 – The Commissioning Process.
C. ASHRAE Guideline 0.2-2015 – Commissioning Process for Existing Systems and Assemblies.”
3. Page 173, Section 102, E; Delete “NC” and after “current” insert “applicable”.
4. Page 174, Section 103, B; Delete “SI&ED” and insert “TCCD”.
5. Page 174, Section 103; Delete Paragraph F in its entirety and renumber subsequent Paragraphs.
6. Page 174, Section 103; Insert the following Paragraph:
“F. BASIS OF DESIGN DOCUMENT: A concise document prepared by the Architect/Engineer (A/E) containing information necessary to fulfill the Owner’s Project Requirements, including design data, required operating conditions, assumptions, calculations, code requirements, references and other data and information as appropriate to fully document the design methodology.”
7. Page 175, Section 104; Delete Paragraph A in its entirety and insert the following:
“A. TCCD will engage the project commissioning CxA. Though contracted to TCCD, the commissioning firm is obligated to work and coordinate with all design professionals, construction managers, contractors, trade sub-contractors, testing and balancing firms and other project team members to deliver a project satisfactory to TCCD.”
8. Page 175, Section 104; Delete Paragraph B in its entirety and insert the following:
“B. The CxA will provide independent third-party building commissioning services in accordance with both listed and applicable ASHRAE standards and guidelines, or other standards as identified by TCCD.”
9. Page 175, 105, A, 1; After “Design review at” delete “the” and insert “specified”.
10. Page 176, Section 107, A; Delete 1 and 3 in their entirety and renumber subsequent sections.
11. Page 177, Section 107, A; Insert the following Sub-Paragraph:
“15. The Cx process shall be tracked using the Cx Alloy web application tool.”
12. Page 178, Section 108, C, 2, d, 3); Delete “Test and Balance” and insert the following: “T&B”.
13. Page 178, Section 108, C, 2, d, 3); Delete “(season)”.



14. Page 178, Section 108, C, 3, c; Insert the following: “, graphics and front end completion.” to the end of the sentence.
15. Page 178, Section 108, C, 3, d; Insert “Review” to the end of the sentence.
16. Page 179, Section 109, A, 8; After “Shops,” insert the following: “Process Systems”.
17. Page 179, Section 109, A, 13; After “Fire Alarm”, insert the following: “ (field observation and installing contractor’s Cx report review only.”
18. Page 179, Section 109, A; Insert the following Sub-Paragraphs:
 - “17. Lighting Controls (Interior and Exterior)
 18. Refrigerant Monitoring
 19. Sump and Sewage Ejection Pump Systems
 20. Fire Suppression Systems (field observation and installing contractor’s Cx report review)
 21. Building Envelope System”
19. Page 179, Section 110; Delete Sub-Paragraph A, 3 in its entirety and insert the following:
 - “3. Commissioning Team:
 - a. Construction Project Manager (PM).
 - b. Construction Manager (CM), if applicable.
 - c. TCCD Infrastructure Director of SI&ED or a designated representative.
 - d. General Contractor (GC).
 - e. Architect/Engineer (A/E) and related Design Professionals (DP)
 - f. Subcontractors responsible for each portion of Work being commissioned: Mechanical Contractor (MC), Electrical Contractor (EC), Plumbing Contractor (PC), Fire Protection Contractor (FP), Testing and Balance Representative (T&B), Controls Contractor (CC), Vendors (as appropriate).
 - g. LEED Consultant, if applicable.
 - h. TCCD or TCCD’s Representative, usually SI&ED.
 - i. Test and Balance Engineer.
 - j. Commissioning Agent (CxA).”
20. Page 181, Section 112, C; Before “PROJECT MANAGER” insert “TCC”.
21. Page 183, Section 113, A; Insert the following Sub-Paragraph: “9. Monthly status report with or without invoicing.”



DIVISION 25

1. Page 185, Section 101, B, 1; Insert the following: “The scope of work shall include but not be limited to the following:”
2. Page 185, Section 101; Delete Sub-Paragraph B, 2 in its entirety and renumber subsequent Sub-Paragraphs in an alphabetical hierarchy.
3. Page 185, Section 101, B, 9; Before “approved media” insert “TCCD”.
4. Page 186, Section 101, F, 1, a; Delete “two (2)” and insert “five (5)”.
5. Page 188, Section 102, B, 3; Delete the first sentence in its entirety and insert the following:
 - “3. Local PC Software: The operator interface panel software shall be compatible with the most current Windows desktop operating system deployed at TCCD.”
6. Page 188, Section 102, C, 2; Delete “main LAN” and insert “TCCD’S building automation VLAN”.
7. Page 189, Section 102, C; Insert the following Sub-Paragraph:
 - “15. The BAS contractor shall coordinate the availability of temporary construction phase network access to facilitate completion of the BAS and start of the TAB and commissioning processes.”
8. Page 189, Section 102; Delete Sub-Paragraph D, 1 in its entirety and insert the following:
 - “1. The graphic software shall be based on the most current Windows desktop operating systems deployed at TCCD.”
9. Page 190, Section 102, D, 1, a, 3); Add the following: “The software shall provide a multitasking type environment that allows the user to run several applications simultaneously.”
10. Page 190, Section 102; Delete Sub-Paragraph D, 1, a, 4 in its entirety and insert the following:
 - “4) The mouse or keyboard shall be used to quickly select and switch between multiple applications. The operator shall be able to work in Microsoft Word, Excel, and other Windows based software packages, while concurrently announcement online BAS alarms and monitoring information.”
11. Page 190, Section 102, D, 1, a, 8, I; Add the following: “Scheduling application shall be capable of important commonly format scheduling files from TCCD space scheduling system Ad Astra.”
12. Page 190, Section 102, D, 1, a, 9, ii; Delete “six” and insert “sixteen”.
13. Page 190, Section 102, D, 1, a, 9, iii; Delete “six” and insert “sixteen”.
14. Page 192, Section 102, D, 1, a, 11, i; Delete first sentence in its entirety and insert “i. System Terminal shall provide audible, visual, email and text and be capable of printed means of alarm indication.”



15. Page 193, Section 102, D, 1, a, 12, i; Delete “operator terminal’s hard disk” and insert “enterprise server.”
16. Page 194, Section 102, D, 1, a, 15, i; Delete “2” after bullet point “Building floor plans” and insert “two”.
17. Page 194, Section 102, D, 1, a, 15, i; After Individual AHU graphics insert the following:
 - “:all AHU graphics shall be accessible from links on both building summaries and floor plans.
 - VAV summary pages by respective AHU with the following but not limited to points:
 - AHU DAT Zone Temperature
 - Active Zone Temperature Set point
 - Active mode: Heating, Cooling or Ventilation
 - Airflow Set point
 - Air flow
 - Damper Position
 - Heating output
 - VAV DAT
 - CO2 level (as applicable)
 - Fan status (as applicable)”
18. Page 194, Section 102, D, 1, a, 15, i; After “data associated with the device.” insert the following:
“Temperature control zones shall be color-coded to their associated AHUs.
19. Page 195, Section 102, D, 2, a; Delete “Access is accomplished by utilizing Microsoft Internet Explorer 9.0 or later” and insert the following: “Access is accomplished by utilizing the current versions of common web browsers including Microsoft Internet Explorer, Google Chrome and Mozilla Firefox.”
20. Page 195, Section 102, D, 2, d; Delete “Tarrant County College District” and insert: “TCCD”.
21. Page 198, Section 102, E, 6, b; Add the following: “Even lower value sensors may be necessary for UFAD systems at TR Campus.”
22. Page 199, Section 102; Delete Sub-Paragraph E, 11, a in its entirety and insert the following:
 - “a. Provide Onicon F-3500 insertion magnetic flow system. If TCCD has owner-furnished Rosemont 8700 Series, magnetic flowmeter systems they may be used. Flow meters shall be configured with dual output terminals to allow connection to the BAS system and to have a spare output for TCCD use. Coordinate flow meter size with flow rates shown on the construction documents. Where flow is used to calculate energy usage, flow meters and matched temperature sensors shall be integrated into Onicon System 10 energy metering interfaces. When large AHU systems perhaps serving an entire building are used then use of Belimo Energy Valves should be evaluated for lower life cycle cost of the system.”
23. Page 201, Section 103, B, 12; Delete “Automatic Control” and insert “Controls”.
24. Page 201, Section 103, C, 1; After “Engineer and” and insert the following: “commissioning and”



25. Page 201, Section 103, C, 2; Delete the first sentence in its entirety and insert the following:
“On-site Provide (24)an appropriate amount of hours of training, mutually agreed upon between the BAS contractor and TCCD”.

26. Page 202, Section 103; Delete Sub-Pararaph E, 1 in its entirety and insert the following:
 - “1. After the Engineer’s verification, an acceptance test of the completed system in the presence of the Owner’s representative, Engineer and CxA shall be performed. When the system performance is deemed satisfactory by these observers and all record (as-built) drawings and commissioning report has been received by the Owner, that part of the system shall be considered complete.”



DIVISION 26

1. Page 219, Section 101, A; Add the following Sub-Paragraph: “7. NFPA 780, Lightning Protection Standard”.
2. Page 219, Section 101; Delete Sub-Paragraph B, 3 in its entirety.
3. Page 217, Section 101, C, 3; Insert the following: “(with the latest edition adopted by AHJ).”
4. Page 219, Section 101, C; Insert the following Sub-Paragraph and renumber subsequent Sub-Paragraphs: “5. Coordination Study and Arc Flash Analysis”
5. Page 220, Section 102, 1; Delete “Lithonia” and insert “ACUITY”.
6. Page 220, Section 102; Delete Sub-Paragraphs A, 4 through 7 in their entirety and insert the following:
 - “4. Power Meters – Schneider Electric
 - PM 5560 series for building service panels or loads that need separate metering up to 1000 amps.
 - PM 8000 series for building service panels or loads that need separate metering above 1000 amps
 - Micrologic 5.0P and 6.0P Trip Units for loads that need separate metering on building service panels down to 400 amp breaker frame size
 - ION 9000 series for Medium Voltage Service Entrances for Campuses or critical loads as determined by TCCD.
 5. Variable Frequency Drives – ABB, ACH series with integral output circuit breaker
 6. Surge Suppression Equipment – ABB Current Technologies
 - SL3(kA rating)(voltage)(configuration)MN(feed)M4EF2 Building Services, MSB’s, Large separately derived sources. Requires HPI cable set from OCP device.
 - CGP-(kA rating)(voltage) other code required or where layered protection is recommended.
 7. Dry-Type Transformers –Square-D EX(kVA)T3HBCU series or Powersmiths E-Saver (kVA)-35H series.”
7. Page 220, Section 103; 4; Delete Sub-Paragraph A, 4 in its entirety and insert the following:
 - “4. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for No. 8
8. Page 221, Section 103; Delete Sub-Paragraph B, 1 in its entirety and insert the following:
 - “1. Medium voltage copper single-conductor shielded power cable, rated 15kV or 25kV as required, type MV-105, 133% insulation level. Cable shall have semi-conducting conductor shield, type EPR insulation, semi-conducting insulation shield, and sunlight-resistant PVC jacket.”
9. Page 221, Section 103; Delete Sub-Paragraph B, 2 in its entirety.
10. Page 221, Section 103, B, 3; Delete “Circuits run with type UD cable do not require separate ground conductor.”



11. Page 221, Section 103; Delete Sub-Paragraph D, 1 in its entirety and insert the following: “1. Rigid Galvanized Steel Conduit: ANSI C80.1”
12. Page 221, Section 103; Delete Sub-Paragraph D, 2 in its entirety and renumber subsequent Sub-Paragraphs.
13. Page 222, Section 103, D; Delete “8.” and revise to read “a.” Renumber subsequent Sub-Paragraphs accordingly.
14. Page 222, Section 103; Delete Sub-Paragraph D, 13 in its entirety.
15. Page 222, Section 103, 12; Insert the following Sub-Paragraph: “a. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.”
16. Page 222, Section 103; Delete “14.” And revise to read “b”.
17. Page 222, Section 103, E, 4; Delete “Walker RC700” and insert the following: “Wiremold Walker Legrand “RC7” “.
18. Page 222, Section 103, E; Insert the following Sub-Paragraphs:
 - “6. Provide special electrical outlet with appropriate NEMA configuration as required.
 7. Provide weatherproof, GFCI, arc fault rated electrical outlet as applicable.”
19. Page 222, Section 104; Delete Paragraphs A through C in their entirety and insert the following:
 - “A. Medium Voltage Switchgear
 1. S&C Vista pad-mounted switchgear for medium voltage campus distribution.
Typical configurations utilized:
936243-F2L2M3OP6R2T4Z5-E231 Model 624 29kV 125 kV BIL 600 Amp Continuous
12.5 kA Fault Interrupting rating
933123-F2L2M3OP4R2T2Z5-E231 Model 312 29kV 125 kV BIL 600 Amp Continuous
12.5 kA Fault Interrupting rating
Alternate manufacturers must be approved through TCCD.
 2. Provide Schneider ION 9000 series metering installed in Elliot Industries PMU for medium voltage service entrance feeds to campuses.
 3. All metering data, including Trip Unit data shall be transported over Ethernet to the TCCD Power Monitoring Expert (PME) Server and integrated into its displays and data bases.
 4. Low pressure alarms for SF6 insulated switchgear shall be connected to nearest building BAS system for monitoring.
 5. FCI Load Tracker LM # 29-6115-3FO-4 utilized to monitor sections of MV loop down stream of switches. This is mounted in the S&C VISTA switch.



Addendum No. 5

TECHNICAL DESIGN GUIDELINES

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- B. Medium Voltage Pad Mounted Transformer
 - 1. Provide ENVIROTEMP listed less-flammable fluid, 65°C rise, copper windings, primary
 - 2. Coordinate protection and features of transformers with TCCD.
 - 3. Manufacturers: ABB or owner-approved equal.
 - 4. Medium Voltage Transformers to be amorphous core type only for units 500kVA and larger. loop feed switch (second MV termination for surge arrester). Transformer efficiency must meet or exceed 2016 or current minimum standards.

- C. Switchgear and Switchboards (480V)
 - 1. Floor-mounted switchboards shall be used for distribution equipment rated 1200 amps and larger.
 - 2. Switchboard bus construction shall be tin-plated copper with a load rating as scheduled. Equip switchboards with grounding and neutral busses.
 - 3. Equip switchboards with molded-case circuit breakers for main and branch protection, with:
 - a. Thermal-magnetic (For frame sizes 250 amp and below, inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits and adjustable magnetic trip setting)
 - b. Electronic trip units (For frame sizes 400 amp and above, field-replaceable rating plug, rms sensing, with the following field-adjustable settings: instantaneous trip, long- and short-time pickup levels, long- and short-time time adjustments (Schneider 5.0P trip units or better) with communication to PME Server.
 - c. Current-limiting circuit breakers (For frame sizes 600 amp and below).
 - d. Appropriate fused disconnects may be utilized where short circuit fault capability cannot be met by circuit breakers for main and or branch circuits.
 - e. Provide ground-fault protection for service entrances of 480/277V, 3 phase, 4 wire which are 1000-amps or larger as per NEC.
 - f. Size switchboards to allow for a minimum 25% spare load capacity, and 40% spare circuit breaker mounting space. Coordinate spare capacity with TCCD.”

20. Page 224, Section 104, E; 5; Delete “115 degrees C” and insert the following: “80°C”.

21. Page 224, Section 104, E; Insert the following Sub-Paragraph: “8. Copper windings.”

22. Page 224, Section 104, F, 1; Delete “Where a service disconnect is provided ahead of an automatic transfer switch, provide a TCSS at the disconnecting means.” and insert the following: “and at all emergency power panels.”

23. Page 224, Section 104, F; Delete “TVSS” in its entirety in Sub-Paragraphs 2 through 4 and revise to read “SPD”.



24. Page 224, Section 104, F, 4; Delete “Coordinate selections with TCCD”.
25. Page 225, Section 104, CABLE CHARACTERISTICS; Under Nominal Impedence, revise “571 pf/ft” to read “57.1 pf/ft”.
26. Page 225, Section 104; Delete Paragraph G in its entirety and insert the following:
 - “G. Motors and Motor Starters
 - a. Motors shall be “NEMA Premium efficiency” designation.
 - b. Motors shall be equipped with inverter rated windings and insulation.
 - c. Motors shall be equipped with an integral shaft-to-casing OEM ground device.
 - d. Motor controls to interface with BMS as dictated by mechanical or other equipment design.
 - e. Fractional horsepower, less than ½ horsepower, manual starter, AC general-purpose, Class A, full-voltage controller for induction motor, with thermal overload element, pilot light, H-O-A switch interfaced with BMS.
 - f. Motor applications, ½ HP and larger require variable speed motor control, provide an ABB variable frequency drive, selected based on current rating of motor. For critical loads discuss drive configuration with TCCD. Provide communications interface/s to BMS system. TCCD shall approve recommended selection.”
27. Page 226, Section 104; Delete Sub-Paragraph H, 1 in its entirety and insert the following: “1. Switchgear manufacturer to provide short circuit, coordination study and arc-flash study.”
28. Page 226, Section 104; Delete Sub-Paragraph H, 4 in its entirety and insert the following:
 - “4. Size feeders and branch circuits to limit voltage drop to 4%, generally apportioned as follows: building service, 1%; feeders, 1%; branch circuits: 2%. Also follow voltage drop requirements prescribed in energy codes.”
29. Page 226, Section 104, I, 3; Delete “UPS”.
30. Page 226, Section 104, I, 3; Add the following: “If emergency generator and associated emergency panel are present, connect EXIT and emergency egress lights to emergency generator panel.”
31. Page 226, Section 104, J, 2; Add the following: “Clearly label disconnect switch with OCP source identification.”
32. Page 227, Section 105; Delete Sub-Paragraphs A, 5 through 12 in their entirety and insert the following:
 - “5. MV cable splices are not allowed.
 6. Where new medium voltage cable is installed in a manhole, specify enough cable length to make one complete loop around manhole from cable entrance to exit.
 7. Medium voltage duct banks shall be Schedule 40 PVC conduit 54” deep, chat encased with a 6” thick concrete cap (dyed red). Utilize long sweep fiberglass elbows for bends. Conduits shall terminate in end bells where duct banks enter manholes.
 8. Provide a continuous detectable tracer tape at least 3” wide, 1 foot above all medium voltage duct banks. “Caution Buried High Voltage Cable Below”.



Addendum No. 5

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9. Provide galvanized rigid steel conduit for above ground exposed locations.
10. Low voltage electrical power duct banks shall be Schedule 40 PVC conduit 42" deep, chat encased with a 6" thick concrete cap (dyed red). This includes building service entrance race ways. Utilize long sweep PVC elbows for bends. Conduits shall terminate in end bells where duct banks enter manholes.
11. Provide a continuous detectable tracer tape at least 2" wide, 1 foot above all low voltage duct banks. "Caution Buried Electric Line Below".
12. Install listed low voltage watertight connectors for wire and cable splices made in hand holes and or manholes below grade. These can only be utilized if approved in writing by TCCD.
13. Low voltage branch circuit conduits shall be 24" below grade.
14. Install appropriately sized cable limiters (at both terminations) where eight (8) or more sets of parallel conductors are required."

33. Page 228, Section 105; Delete Sub-Paragraph C, 1 in its entirety and re-number the subsequent Sub-Paragraph.

34. Page 228, Section 105, D, 1, EXTERIOR ILLUMINATION LEVELS; Delete table in its entirety and insert the following table:

AREA DESCRIPTION	DESIGN FOOTCANDLES		AVG : MIN RATIO
	Active	Inactive	
Walkways, Bikeways, and Stairways	1.0	-	3:1
Courtyards	0.5	0.2	3:1
Building Entrance	5	1	3:1
Building Surrounds	0.5	0.2	4:1
Parking Lot	1.0 (0.5 min)	0.5 (0.2 min)	3:1
Roadway	1	-	4:1
Emergency Phones	5	-	-
Information Signs	5	-	-

35. Page 228, Section 105, D, 3; Delete "or 480V".

36. Page 228, Section 105, D, 4; Delete "wherever available, or a time clock and photocell with manual override, or as determined by TCCD".

37. Page 228, Section 105; Delete Sub-Paragraph E, 1 in its entirety and insert the following:

1. Reference TCCD Lighting Playbook for standard exterior fixture schedules.
2. Building mounted area lights will be selected to match or coordinate with adjacent pole mounted fixtures."

38. Page 229, Section 105; Delete Sub-Paragraph F, 2 in its entirety and insert the following: "2. LED is the preferred lamp type; Sodium vapor, metal halide, mercury vapor and incandescent lamps shall not be used."

39. Page 229, Section 105, G, 10; Delete "per local code" and insert the following: "per Gulf Coast rating".



40. Page 230, Section 105; Delete Sub-Paragraphs H, 1 and 2 in their entirety and insert the following:
“ 1. The preferred method of control for exterior lighting including roadways is through ROAM system on TCCD servers.”

41. Page 230, Section 105, J, 3; Delete “A service entrance of 120/240 volt, single phase, 3 wire or 120/240 volt 2 phase open or closed delta 4 wire must be approved by TCCD.” and insert the following: “but must be approved in writing by TCCD.”

42. Page 232, Section 105, L, 1; Revise Sub-Paragraph to read:
 - “1. Reference the current version of the TCCD Lighting Playbook and its standard fixture schedule.
 2. Illumination foot candle levels shall be based on the recommended values given in the IESNA Handbook and allowances prescribed by the energy codes.”

43. Page 232, Section 105; Delete Sub-Paragraph L, 2 in its entirety and insert the following: “3. Task lighting as appropriate for the application. Coordinate in writing with TCCD.”

44. Page 232, Section 105; Delete Sub-Paragraph L, 4 in its entirety.

45. Page 232, Section 105, Sub-Paragraph L, 6; Insert the following:
 - “1. Delete “relamping and”
 2. Delete “ballasts” and insert “drivers”.

46. Page 232, Section 105; Delete Sub-Paragraph L, 7 in its entirety.



DIVISION 27

1. Page 235, A; Insert the following Sub-Paragraph:
 - “2. The contractor shall place and maintain on the project a sufficient number of skilled installers who are thoroughly educated and experienced on the necessary crafts and completely familiar with the specified requirements and methods needed for the proper performance and completion of the work.”
2. Page 235, B; Add the following: “(APPENDIX B SEC 27-05-00 page 1-33)”
3. Page 235, B, 1; After “(BICSI) insert the following: “IEEE, ISO/IEC, CENELEC, ANSI & TIA.” and adjust capitalizations accordingly.
4. Page 235, C; Add the following: “(APPENDIX B SEC 27-05-00, 27-05-43 & 27-13-00)”
5. Page 235, C, 3; After “Provide” insert the following: “POLYETHYLENE TUBING or”.
6. Page 235, D; Add the following: “(APPENDIX B SEC 27-05-00, 27-05-43 & 27-15-00)”
7. Page 235, D, 2; Add the following:

“Fiber Backbone: Provide one 24 strand Single Mode Fiber and one 12 Strand Multi-mode OM4 Fiber in one pathway and one 6 strand single Mode and 6 strand OM4 Multi-mode Fiber in a separate pathway; Pathway diversity is require for Fire Alarm signal transmission. Fiber optic cabling, not in conduit or armored, must be installed in properly rated innerduct.”
8. Page 235, E; Add the following: “(APPENDIX B SEC 27-05-00, 27-05-43 & 27-15-00)”.
9. Page 235, F; Add the following: “(APPENDIX B SEC 27-05-00, 27-13-00)”
10. Page 236, F, 2; After “minimum of” insert: “24-“.
11. Page 236, G; Add the following: “(APPENDIX B SEC 27-05-00, 27-05-53 & 27-15-00)”.
12. Page 236, H; Add the following: “(APPENDIX B SEC 27-05-00)”.
13. Page 236, H, 4; Add the following: “(PANDUIT)”
14. Page 236, I; Add the following: “(APPENDIX B SEC 27-05-00 & 27-15-00)”.
15. Page 237, J; Add the following: “(APPENDIX B SEC 27-05-00)”.
16. Page 237, J; Insert the following Sub-Paragraph: “2. All wireless cabling must be CAT 6a with a termination designation color code violet part# PANDUIT CJ6X88TGVL”.
17. Page 237, K; Add the following: “(APPENDIX B SEC 27-05-00, 27-05-53 & 27-11-00”.



18. Page 237, K; Insert the following Sub-Paragraphs:

- “9. All MER & TR doors must be solid without windows.
10. No equipment should be permanently installed behind equipment racks.”

19. Page 239, L; the following: “6. Ensure that proper arrangements have been made for wire management between main communications and electronic access control systems.”

20. Page 240, M; Add the following: “(APPENDIX B SEC 27-05-00, 27-05-23, 27-11-00 & 27-16-19)”.

21. Page 240, N; Add the following: “(APPENDIX B SEC 27-05-00)”.

22. Page 240, N, 2; After “required” insert the following: “using #6AWG green.”

23. Page 240, N; Add the following: “Each equipment rack must be individually bonded to MER/TR main bus bar using #6 AWG green wire.(NO DAISY CHAIN WILL BE ACCEPTED)”.

24. Page 240, O; Add the following: “APPENDIX B SEC 27-05-53”.

25. Page 240, O; Insert the following Sub-Paragraph:

- “4. Prior placement of any permanent labels, contractor must coordinate with TCCD Communications Services or Project manager.”

26. Page 240, P; Add the following: “(APPENDIX B SEC 27-16-19)”.

27. Page 241, P; Insert the following Sub-Paragraph:

- “3. Contractor shall provide two (2) Category 6A patch cords per wireless access point cable installed shall be violet in color and coordinate lengths and quantities with TCCD.”

28. Page 241, Q; Add the following: “(APPENDIX B SEC 27-20-00)”.

29. Page 241; After Paragraph “R.” insert the following:

“Quality of assurance

1. The contractor shall place and maintain on the project a sufficient number of skilled installers who are thoroughly trained and experienced on the necessary crafts and completely familiar with the specified requirements and methods needed for the proper performance and completion of the work. If worker is found to be deficient in this area, the contractor must immediately provide necessary training to remove the deficiency or replace the worker with one having the required skills.”



Addendum No. 5

TECHNICAL DESIGN GUIDELINES

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DIVISION 28

1. Page 250, Section 109, B; Insert the following Sub-Paragraph:
 - “2. Z0459
Unit: 3-1/2” Flushmount
Finish: Black
Single Button w/EMERGENCY/EMERGENCIA Bezel
Voltage: 24v
Power Option: Line Power
Communication Option: Line Communication
Custom: Police Shield between Speaker opening and Bezel”
2. Page 250, Section 109, B, 3; Add the following:

“Corridor phones shall be surface-mounted except at Trinity River Campus where they shall be flush-mounted. On all phones, the call button centerline 48” above finished floor. Interior flush mount installations require a custom fabricated trim ring which needs to be contractor furnished.”
3. Page 250, Section 109, B; Insert the following Sub-Paragraph:
 - “4. Code Blue IP5000 FP1 Speakerphone (see applicable specifications for wall-mounted phone above) Bollards with parapet mounts need to be ordered separately. A quad power outlet and a means of disconnect is required in each bollard. For communications, if run from the building is over 300 feet fiber is required, if under 300 feet copper can be used, but surge protection is required. If fiber is used, a IE3000 switch is needed in the bollard. Overcurrent protection needs to be contractor furnished, contractor installed. Coordinate all camera selections and specifications with the TCCD Police Systems Administrator.”
4. Page 250; Insert Section 110 and re-number subsequent Articles.
 - “1.10 EMERGENCY NOTIFICATION SYSTEMS
 - A. The standard physically built emergency notification system shall consist of networked Alertus Technologies beacons located at public personal protection (Code Blue) stations within buildings. Consult TCCD Real Estate and Facilities and Emergency Management Departments for more specific requirements.”
5. Page 250; Delete Section 111 in its entirety and insert the following:
 - “1.11 CLOCK SYSTEMS
 - A. Consult TCCD Real Estate and Facilities Department for specific requirements.”
6. Page 251, Section 111, C, 2; Delete “Simplex Grinnell” and insert the following: “JCI Simplex”.
7. Page 251, Section 111, D, 1, a; Add the following: “All fire alarm systems work shall be reviewed and approved by local and state AHJs.”
10. Page 251, Section 111; Delete Sub-Paragraph D, 1, b in its entirety and renumber subsequent Sub-Paragraphs.



11. Page 252, Section 111, D, 4, a; Before “tested” insert “field”.
12. Page 252, Section 111, D, 4, a; After “certified” insert the following: “by the system manufacturer’s representative”.
13. Page 252, Section 111, E, 1, c; Before “conduit” insert “in”.
14. Page 252, Section 111, E, 1, c; Add the following: “All fire alarm detection wiring shall be red in color, notification device wiring shall be yellow and voice wiring shall be blue.”
15. Page 252, Section 111, E, 4, b; After “smoke detectors” insert the following: “all classrooms, any areas with multiple occupants.”
16. Page 252, Section 111, E, 6, a; Delete “and”.
17. Page 252, Section 111, E, 7, a; Delete “on” and insert “or”.
18. Page 252, Section 111, E, 7, a; Delete “Grinnell” and insert “Simplex 4100 ES”.



DIVISION 32

1. Page 265, Section 103, J, b, 5; Delete “Bronze gate” and insert the following: “Spears ball”.
2. Page 265, Section 103, J, b, 7; Insert the following: “. Label all valves per TCCD instruction.”
3. Page 265, Section 103, J, 11), ii; After “Turf:” delete “.6 or”.
4. Page 265, Section 103, J, 11), ii; After “:” delete “.6 or”
5. Page 265, Section 103, J, 13); Delete “one stop can be used for small systems with 2” and smaller mains.”



DIVISION 33

1. Page 269 Section 102, A; Add the following:
“All public utilities shall be designed to the standards set forth by the AHJ. New utility services should be avoided; tie into existing utility networks/systems. Exceptions must be justified utilizing life cycle analysis accounting for first cost, utility and maintenance recurring cost over a minimum 30-year term.”
2. Page 269, Section 102; Delete Paragraph B in its entirety, insert the following and renumber subsequent Paragraphs:
 - B. Provide GPS coordinates for all utilities including top-of-pipe elevation before trenching is closed.
 - C. All piping and materials used in utility projects must be domestically manufactured.”
3. Page 269, Section 102, D, 1, e; After “All private water lines” insert the following: “and larger”.
4. Page 269, Section 102, D, 1, f; After “Class 200 and” insert the following: “SDR21 (4” and smaller within five feet of the building perimeter”
5. Page 269, Section 102, D, 1, j; Add the following:
“Every valve box shall be labelled using Berntsen stainless steel tags recessed into the concrete collar; coordinate with TCCD for utility type, flow arrow and numbering convention.”
6. Page 270, Section 102; Delete Sub-Paragraph D, 2, e, 3) in its entirety and renumber subsequent Sub-Paragraphs.
7. Page 271, Section 102, D, 2, f; Delete “sewer” and insert “drainage”.
8. Page 271, Section 102, D, 2, g; Revise “Manufactures” to read “Manufacturers”
9. Page 271, Section 102, D, 2, g; Delete “sewer” and insert “drainage”.
10. Page 271, Section 102, D, 3; Before “Gas” insert “Natural”
11. Page 271, Section 102, D, 3, a; Before “Gas” insert “Natural” and adjust subsequent capitalizations.
12. Page 271, Section 102, D, 3; Insert the following Sub-Paragraph:
 - c. Natural gas valves shall be concrete-collared and labelled (see water valve box labeling) and shall have tracer stations located every 200 linear feet along their runs across the site.”
13. Page 271, Section 102, D, 4, b; After “concrete encased” insert the following: “with red-dyed 6” concrete caps over a chat bed enveloping the conduit.”
14. Page 271, Section 102, D, 4, d; Insert the following: “Manholes and pullboxes shall be labelled per TCCD instruction.”



15. Page 271, Section 102, D, 5, a; Delete “for by the AHJ” and insert the following: “forth by TCCD.”
16. Page 271, Section 102, D, 6; Delete “Hot” and insert “Heating”
17. Page 271, Section 102, D, 6; Combine a and b into a single Sub-Paragraph “a.”.
18. Page 271, Section 102, D, 6; Insert the following Sub-Paragraph:
 - “b. Pre-insulated piping systems shall be Thermacor. Piping material shall be selected according to application.”



APPENDIX B

1. Page 6, Section 105, A; Insert the following: Sub-Paragraph:
 "2. In addition TDDC shall be provided with red lines drawings upon 48 hours of the last cable pulled."
2. Page 9, Section 105, G, 2; Delete "OM3" and insert "OM4".
3. Page 10, Section 105; Delete Sub-Paragraph I, 4 in its entirety and insert the following:
 "4. Horizontal cabling shall terminate on rack mounted Category 6 48 port angled patch panels in the ER/TRs, and on RJ45 568B Category 6 inserts at the outlet. Information outlets shall be blue."
4. Page 10, Section 105; Delete Sub-Paragraph I, 5 in its entirety and insert the following: "5. Floor poke thru devices must be specified with adapters designed to accept Panduit jack."
5. Page 27, Section 102; Delete Paragraph H in its entirety and insert the following:
 "H. Cables shall be neatly dressed along common paths with properly rated Velcro tie. Maximum number of cables per bundle shall not exceed manufacturer specifications."
6. Page 29, A; Section 202; Delete Paragraph A in its entirety and insert the following:
 "A. Use of J-hooks to support communications cabling is only permitted above suspended ceiling areas where it is not possible for building occupant to see cable jackets. No metal J-Hooks will be accepted."
7. Page 31, Section 207, G; After "maximum span" insert the following: "of 5ft".
8. Page 34, Section 102, F; After "mesh innerducts" insert the following: "or four (4) 1" Ribbed high density polyethylene (HDEP) with pre-installed pull tape".
9. Page 35, Section 201; Insert the following Paragraph:
 "C. Polyethylene Tubing
 1. 1" inside to be ribbed.
 2. Only manufacturer's fittings, transition adapters, terminators, accessories and installation kits shall be used.
 3. Shall be populated with a measured pull tape.
 4. Manufacturer: PETROFLEXNA Part # P100NTC-7"
10. Page 37, Section 304; Insert the following Paragraph:
 "C. No more than two 90-degree bends (or a total of 180 degree) should be designed or installed between pulling points, a 90-degree bend should never be exceeded."



11. Page 54, Section 204; Delete Paragraph A in its entirety and insert the following:
 - A. Fiber optic cabling:
 1. 9 um OS2 24 Strand Fiber OSP Fiber. Panduit Number : FSTN924
 2. 50 um OM4 12 Strand Fiber OSP Fiber. Panduit Number: FOTNZ12
 3. 9 um OS2 6 Strand Fiber OSP Fiber. Panduit Number : FSTN906
 4. 50 um OM4 6 Strand Fiber OSP Fiber. Panduit Number: FOTNZ06
 5. 6 Strand 50 micron OM3 Multimode Plenum Rated Armored Fiber. Panduit Part Number: FOPPX06Y (For Fire Alarm Panel Connectivity);
 6. Should cable availability become an issue due to excessive manufacturer lead times, approved equal fiber optic cabling manufactured by Corning may be submitted for owner consideration.”
12. Page 55, Section 205, A; After “Multimode Fiber Adaptor Panels” insert the following: “#FAP6WAQLCZ”.
13. Page 55, Section 205, B; After “Multimode Fiber Adaptor Panels” insert the following: “#FAP6WAQLCZ”.
14. Page 55, Section 205, C; After “Multimode Fiber Adaptor Panels” insert the following: “#FAP6WAQLCZ”.
15. Page 58, Section 102, B; After “RJ45” insert the following: “568B”.
16. Page 59, Section 202, A; Delete “#7131900” and insert the following: “7131930”
17. Page 59, Section 204; Delete Paragraph A in its entirety and insert the following:
 - A. Category 6 modular jack inserts: Data (blue) Panduit - Product Number: #CJ688TGBU.”
18. Page 60, Section 301, B; Delete “T568A” and insert “T568B”.

END OF ADDENDUM 5