Design Loads:

AISC 360-15

AISI S100-16

Ro	of Loads:		Wi	nd Loads:		Se	ismic Loads:	
•	Dead Load:	20 psf	•	Occupancy:	II	•	le:	1.0
•	Solar Dead Load:	10 psf	•	Velocity:	109 mph	•	Ss:	0.099 ફ
•	Live Load:	20 psf	•	Exposure:	С	•	S1:	0.068 ફ
			•	lw:	1.0	•	Site Class:	D
						•	Sds:	0.105 §
			Sno	ow Loads:		•	Sd1:	0.109 §
			•	Pg, Pm:	20 psf	•	Seismic Design Category:	В
			•	Pf:	14 psf	•	Seismic Force- Resisting Syster	n: L.F.S.W
			•	Ce:	1.0	•	Design Base Shear:	CsW
			•	ls:	1.0	•	Cs:	0.053
			•	Ct:	1.0	•	R:	2
			Dri	ft Load:	Per Plan	•	Analysis Procedure Used:	E.L.F.P

1. Dead load shown includes collateral load of 3 psf. 2. See components and cladding table for design wind pressures.

0.6h 9.77 7.79	COMPONENTS	& CLADDIN	G WIND PRE	ESSURES
6.0.		Effective	Max. +VE	MaxVE
		Wind Area	Pressure	Pressure
	Zone	(sq ft)	(psf)	(psf)
	1 - Roof Interior	10	16.0	-40.1
Zone 1' 0.2h	1 - Roof Interior	20	16.0	-37.5
Zone 1	1 - Roof Interior	50	16.0	-34.0
Zone 2	1 - Roof Interior	≥ 100	16.0	-31.3
Zone 3	1' - Roof Interior	10	16.0	-23.0
	1' - Roof Interior	20	16.0	-23.0
	1' - Roof Interior	50	16.0	-23.0
	1' - Roof Interior	≥ 100	16.0	-23.0
	2 - Roof Edge	10	23.0	-52.9
	2 - Roof Edge	20	22.0	-49.5
Components & Cladding Wind Zone Diagram	2 - Roof Edge	50	20.7	-45.0
	2 - Roof Edge	≥ 100	19.7	-41.6
 The components & cladding (C&C) wind pressures shown 	3 - Roof Corner	10	23.0	-52.9
assume a mean roof height of 13'-10" above finished floor	3 - Roof Corner	20	22.0	-49.5
elevation. All components shall be designed to resist the	3 - Roof Corner	50	20.7	-45.0
provided pressures, which shall be clearly defined on all shop	3 - Roof Corner	≥ 100	19.7	-41.6
drawings. Refer to wind zone diagram for zone locations. Plus and minus signs signify pressures acting toward and away from	4 - Wall Interior	10	23.0	-25.0
surfaces, respectively.	4 - Wall Interior	20	22.0	-23.9
	4 - Wall Interior	50	20.7	-22.6
2. The components & cladding wind zone diagram is	4 - Wall Interior	≥ 100	19.7	-21.6
generalized to show all possible conditions. The diagram shape	5 - Wall Edge	10	23.0	-30.7
may not match the specific layout for this project.	5 - Wall Edge	20	22.0	-28.7
2. Johannal Bararana Confficient, 10.40	5 - Wall Edge	50	20.7	-26.0
3. Internal Pressure Coefficient = ±0.18	5 - Wall Edge	≥ 100	19.7	-23.9

1. The structural systems shown on these documents have been designed for the final, in place usage of the structure based on the intended occupancy and code requirements. While general constructability has been considered, the structural systems have not been designed to accommodate specific construction means and methods that might be utilized by the Contractor.

- 2. The Contractor shall field verify all existing dimensions prior to fabrication.
- 3. The Contractor shall notify the Engineer of any observed discrepancies in dimensions, detailing, or other items as shown on the plans or specified prior to proceeding with work relating to said discrepancies.
- 4. The Contractor shall not alter or modify work shown on the structural drawings without receiving written approval from the Engineer.

5. The Contractor shall be responsible for supplying shop drawings for structural steel, metal deck, reinforcing steel, concrete masonry units and accessories, plan and elevation views of concrete masonry wall elevations including control joint and expansion joint locations, mortar and grout, and concrete mix designs. Shop drawings must be reviewed for conformance with the means, methods, techniques, sequences, and operations of construction, and safety precautions and programs incidental thereto, all of which are the sole responsibility of the Contractor, and shall be stamped "approved" by the Contractor prior to submittal. Shop drawings submitted without the Contractor's stamped approval will be returned "rejected". All shop drawings shall be reviewed by the Structural Engineer prior to construction.

6. See architectural, mechanical, and electrical drawings for other pertinent information related to the structural work and coordinate as required. These structural drawings are intended to be included in a complete set of construction documents, including but not limited to, architectural drawings, civil drawings, and mechanical/electrical/plumbing drawings. Contractor shall verify coordination of these drawings with contents of above drawing sets specified and only proceed with bidding and construction after such has taken place.

7. The building and the independent structural components shown in these documents are not structurally stable until all connections, framing, shear walls, diaphragms, permanent bracing, metal decking, interior and exterior concrete slabs on grade, and exterior or interior load-bearing walls are complete and have achieved their design strength. Contractor is solely responsible for maintaining structural stability during erection and construction. Temporary bracing systems shall remain in place until all structural work is complete.

8. The Contractor is responsible for verifying all existing dimensions and conditions of the existing building and reporting discrepancies from the assumed conditions shown on the structural drawings to the Engineer of record prior to fabrication and erection of any member.

9. The Contractor shall coordinate the roof drainage system with the Architect as required to ensure that no more than 3 1/2" of water can accumulate before entering an overflow drainage system.

Structural Engineer Site Observations:

1. The contract structural drawings & specifications represent the finished structure, and, except where specifically shown, do not indicate the method or means of construction. The Contractor shall supervise and direct the work and shall be solely responsible for all construction means, methods, procedures, techniques, and sequence.

2. The Engineer shall not have control nor charge of and shall not be responsible for, construction means, methods, techniques, sequences, or procedures, for safety precautions & programs in connection with the work, for the acts or omission of the Contractor, subcontractor, or any other persons performing any of the work, or for the failure of any of them to carry out the work in accordance with the contract documents.

3. Periodic site observation by field representatives of BSE Structural Engineers LLC. is solely for the purpose of determining if the work of the Contractor is proceeding in general accordance with the structural contract documents. This limited site observation should not be construed as exhaustive or continuous to check the quality or quantity of work, but rather periodic in an effort to guard the Client against defects or deficiencies in the work of the

Slab On Grade:

1. Welded wire fabric shall be supplied in sheets only. Rolls will not be permitted. (As required on construction

2. Welded wire fabric shall be supported on chairs or blocks prior to concrete placement. Mesh shall not be hooked and pulled up during concrete placement. (As required on construction documents.)

3. Welded wire fabric shall have end and edge laps of one full mesh plus 2" between cross wires. Wire all laps securely together.

4. Welded wire fabric shall conform to ASTM A1064.

5. Floor finish requirements: Slab-on-grade shall be finished to overall floor flatness, overall floor levelness, local floor flatness, and local floor levelness requirements as defined by the Owner. Coordinate requirements as required with G.C. prior to slab-on-grade placement. Floor finish requirements to be determined in accordance with ASTM E 1. All structural steel shall conform to the following (U.N.O.):

1. Foundations for this project have been designed in accordance with requirements set forth in a geotechnical

report prepared by Terracon Consultants (Project #02215001) dated July 21, 2021. Continuous and individual

footings have been designed for an allowable soil bearing value of 1500 psf. The Contractor shall refer to the

2. Anchor rods shall conform to ASTM F1554 Gr. 36 (U.N.O.) and shall be located by means of a template. Provide a nut above and below template to assure proper vertical alignment.

Geotechnical Report for all requirements and recommendations pertinent to this project.

- 3. All foundations shall be square and level.
- 4. Grout shall be dry and stiff to prevent shrinkage, with a minimum compressive strength of 4000 psi. Grout below column base plates and precast panels as required. Thoroughly compact grout beneath base plates.

Concrete and Reinforcing Steel:

1. Concrete mix designs shall meet the following requirements:

	Minimum Compressive	Max. Aggregate	Max. Water/Cement	Slump	
Location	Strength (psi)	Size	Ratio	(in.)	Air Entrainment (%)
Interior Slabs	4000	3/4"	0.50	4 ± 1	0
Exterior Slabs	4500	3/4"	0.45	4 ± 1	6 ± 1
Interior Foundations	3500	1"	0.50	4 ± 1	0
Perimeter Foundations	3500	1"	0.50	4 ± 1	6 ± 1

2. Fly ash shall not be used unless approved in writing by the Engineer. Fly ash, if approved, shall conform to ASTM C618 and ACI 232.2R-96. Fly ash shall be limited to types C & F and shall not exceed 15% of the total cement mass.

- 3. The use of admixtures to increase the slump shall not be used unless approved in writing by the Engineer.
- 4. All concrete is reinforced unless specifically called out as unreinforced. Reinforce all concrete not otherwise shown with same steel as in similar sections or areas.
- 5. Construction joints in grade beams shall be at midspan unless noted otherwise. Reinforcing steel shall be continuous through construction joints unless noted otherwise.

6. No aluminum items shall be embedded in any concrete or placed in contact with concrete. 7. Reinforcing bars #4 and larger (except ties and stirrups) shall meet ASTM A615 with Supplementary

8. Concrete coverage of reinforcement shall have the following clear distances unless noted otherwise on the drawings:

Cast against earth: 3"

Formed concrete exposed to earth or weather: 2'

Requirements (S1), Grade 60. Smaller bars shall be Grade 40.

Not exposed to earth or weather: 1" Slabs, 1 1/2" Beams and columns

9. Embedded and all reinforcing bars marked continuous shall be embedded to develop the full tensile capacity of the bar. Laps shall be Class B tension laps unless specified otherwise on the drawings. Unless shown otherwise, splice top bars near midspan and splice bottom bars over supports.

10. Supply corner bars 4'-0" long (min. 2'-0" in each direction) in outside face of wall at corners of all walls and grade beams, matching size and spacing of horizontal bars. Where there are no vertical bars in outside face of wall, supply three (3) - #4 vertical support bars for corner bars.

11. All bars are to be supported in forms and spaced with wire bar supports per ACI "Manual of Standard Practice for Detailing Concrete Structures" (latest edition). Bars shall be securely wired per the latest edition of CRSI's "Recommended Practice for Placing Reinforcing Bars." Accessories for exposed concrete shall be plastic or shall have

12. Concrete placed during cold weather shall conform to the requirements of the most recent version of ACI 306R. Cold weather is defined as a period when, for more than 3 successive days, the mean daily temperature drops below

13. Concrete placed during hot weather shall conform to the requirements of the most recent version of ACI 305R. Hot weather is defined as that combination of air temperature, concrete temperature, relative humidity and wind speed that will cause a rate of evaporation of 0.2 lb/sq.ft./hr. or more as defined by Figure 2.1.5 of ACI 305R.

15. Provide 3/4" chamfer on all exposed corners unless noted otherwise on architectural or structural construction

14. Do not add water to concrete during delivery, at Project Site, or during placement, unless approved by the

documents. 16. All cold joints shall be roughened and cleaned unless noted otherwise.

17. Vertical control joints in walls shall be placed at 30'-0" maximum spacing unless noted otherwise. Locate joints beside piers monolithic with walls, near corners, and in concealed locations where possible. Construction joints may be placed in lieu of control joints at contractors discretion. Coordinate location of control joints with Architect.

18. Refer to architectural drawings for foundation insulation requirements.

Post-Installed Anchors:

Post-Installed anchors shall only be used where specified in the construction documents or approved by t

2. The Contractor shall obtain written approval from the Engineer prior to installing post-installed anchors for misplaced-placed anchors.

3. Care shall be taken with placing post-installed anchors to avoid damaging existing reinforcement.

4. The holes shall be drilled and cleaned in accordance with the manufacturer's specifications.

5. Post-installed anchors shall meet ACI 318 Appendix D criteria. The following are acceptable post-installed anchors: All adhesive anchoring systems referred to in these drawings shall be one of the following:

a. Hilti HIT HY 200 b. Powers AC100+ Gold c. Simpson Strong-Tie SET-3G

d. Or Approved Equivalent All screw anchors referred to in these drawings shall be one of the following:

a. Hilti KH-EZ b. Powers Wedge Bolt+ c. Simpson Strong-Tie Titan HD

d. Or Approved Equivalent

1. Mortar shall be Type S for all masonry work and must achieve a minimum compressive strength of 1800 psi at the 28-day test. Masonry units shall have a minimum strength of f'm = 2000 psi.

2. Masonry grout shall be a coarse-type grout and must achieve a minimum compressive strength of 2000 psi at the 28-day test. Slump shall range from 8" minimum to 10" maximum. Grout materials and proportions shall conform to

3. All masonry shall be reinforced with horizontal 9 gauge truss type reinforcement at 16" o.c. vertical or as shown on the drawings.

I. Vertical reinforcing shall be installed as noted on the drawings. Reinforcing bars shall be lapped as specified on the design drawings. If no lap length is shown, contact the Engineer.

5. Vertical control joints in masonry shall be 3/8" wide, full height of wall at locations shown on the Architectural drawings. Joints shall be spaced at a maximum of 25'-0" apart and coordinated with the Architect. All horizontal joint reinforcing shall be discontinuous at masonry control joints. Refer to typical details for additional information

6. Lintels over openings shall be installed as indicated on the drawings. If no lintels are indicated, notify the

7. Provide at least (1) vertical rebar at each end of each wall, side of control joints, jambs, corner, and intersection of all reinforced masonry walls. Size of rebar to match the size of typical vertical reinforcing shown.

8. Provide (1) corner bar at each horizontal bond beam. Size of rebar to match typical bond beam reinforcing shown. 9. Submit shop drawings including plan and elevation views of reinforced masonry walls including bond beams,

control joints, expansion joints, and lintels. 10. All steel beams bearing on masonry shall have (3) cores minimum grouted full directly below the bearing locations unless noted otherwise.

11. All bond beam reinforcing shall continue through control joints.

12. All cells containing reinforcement, bolts, or other metal anchors shall be grouted solid. Any cells below grade shall be grouted solid whether reinforced or not.

Structural Steel Wide Flanges: ASTM A992 Miscellaneous Steel: ASTM A36 Structural Tubing: ASTM A500, Grade B (Fy = 46 ksi) ASTM A53, Type E or S, Grade B Steel Pipe:

2. Bolts shall be as follows (U.N.O.):

ASTM A325 Connection Bolts: Anchor Rods: ASTM F1554, Grade 36 ASTM A108, Grade 1015 through 1020 Shear Studs:

3. Welding shall conform to the latest publication of applicable codes set forth by the American Welding Society. Welding electrodes shall be E70XX.

4. All exterior steel exposed to weather shall be hot-dipped galvanized and/or painted per Architect unless noted

5. All openings in the roof shall be framed with a 4 x 4 x 1/4 angle minimum, unless noted otherwise. Mechanical units shall be supported with structural steel frames as required. If framing is not shown for mechanical units, notify

Light Gauge Metal Framing:

1. All light gauge structural studs, track and accessories shall be designed in accordance with the latest edition of the American Iron and Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members," and shall be of type, size, gauge and spacing shown on the drawings.

2. All 16 gauge and heavier studs and joists shall be formed from corrosion-resistant steel corresponding to the requirements of ASTM A446, with a minimum yield strength of 50 ksi. All 18 gauge and lighter studs, joists, track and accessories shall be formed from corrosion-resistant steel corresponding to the requirements of ASTM A446, with a minimum yield strength of 33 ksi.

3. Prior to fabrication of framing, the Contractor shall submit fabrication and erection drawings to the Architect/Engineer for approval.

4. Prefabricated panels shall be square, with components attached in a manner to prevent racking and minimize distortion while lifting. The Contractor shall provide temporary bracing where required. 5. All framing components shall be cut squarely for attachment to perpendicular members, or as required, for

angular fit against abutting members. Splicing of axial loaded members is not permitted. 6. Axially loaded study shall be installed in a manner which will assure that their ends are positioned against the inside of the track web prior to fastening. Studs shall be securely fastened to both flanges of the top and bottom

7. Fastening of components shall be with self-drilling screws or welding. Wire tying of components shall not be permitted. Screws shall be of sufficient size to ensure the strength of connection. All connections shall be made with a minimum of (2) #10 screws or 1/8" fillet weld two inches long. All welds shall be touched up with a zinc-rich

8. Tracks shall be securely anchored to the supporting structure as shown on the drawings. Abutting lengths of tracks shall be securely anchored to a common structural element, butt-welded or spliced together.

9. Wall stud bridging shall be attached in a manner to prevent stud rotation. Bridging rows shall be spaced according to manufacturer's specifications or recommendations. 4'-0" maximum spacing between rows of bridging.

10. Provision for structure vertical movement shall be provided where indicated on the drawings. 11. Minimum thickness values of framing specified in gauge values on drawings are as follows:

Design Thickness	Inside Corner	Gauge No.
(in.)	Radius (in.)	(Reference Only)
0.0188	0.0843	25
0.0283	0.0796	22
0.0312	0.0781	20 - Drywall
0.0346	0.0764	20 - Structural
0.0451	0.0712	18
0.0566	0.0849	16
0.0713	0.1069	14
0.1017	0.1525	12
	(in.) 0.0188 0.0283 0.0312 0.0346 0.0451 0.0566 0.0713	(in.) Radius (in.) 0.0188 0.0843 0.0283 0.0796 0.0312 0.0781 0.0346 0.0764 0.0451 0.0712 0.0566 0.0849 0.0713 0.1069

NOTE: Minimum Thickness represents 95% of the design thickness and is the minimum acceptable thickness delivered to the job site based on Section A3.4 of the 1996 AISI Specification.

.. The following items require special inspection in accordance with the building code.

a. Reinforced masonry construction - level 1 inspection b. Concrete & masonry grout design mix

c. Placing of concrete & reinforcing steel d. Bolts & anchors embedded in concrete & masonry

e. Concrete formwork f. Structural steel fabrication g. Structural steel bolting & welding

applicable workmanship provisions of the governing building codes.

h. Inspection of roof & deck attachment Post installed anchors in masonry & concrete J. In-situ soils, excavations, filling & compaction

The Contractor shall request special inspection of the items listed above prior to those items becoming inaccessible & unobservable due to progression of the work.

3. The Special Inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the building official, for inspection of the particular type of construction or operation requiring special inspection. 4. The Special Inspector shall observe the work assigned for conformance with the approved design drawings

5. The Special Inspector shall furnish inspection reports to the Building Official, the Engineer and Architect of record, and other designated persons. All discrepancies shall be brought to the immediate attention of the

Contractor for correction, then if uncorrected, to the proper design authority and to the Building Official. 6. The Special Inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance with the approved plans and specifications and the

and specifications.

1. The Inspector must verify that the preparation of the natural ground and the placement of engineered fill is performed in accordance with the GEOTECHNICAL engineer's recommendations as stated in the GEOTECHNICAL

2. The Inspector must monitor the placement of all fill to determine whether the type of material, moisture content, and degree of compaction are within the recommended limits contained in the GEOTECHNICAL report. Proceed with subsequent earthwork only after test results for previously completed work comply with recommended limits contained in the GEOTECHNICAL report.

3. All Subgrade supporting footings and slabs must be inspected immediately prior to the placement of

4. Paved and building slab areas shall be tested at Subgrade and at each compacted fill and backfill layer, at least once for every 2000 sq. ft. or less of paved or building slab areas, but in no case fewer than 3 tests. 5. Foundation wall backfill shall be tested at each compacted initial and final backfill layer, at least once for each 100 ft. or less of wall length, but no fewer than 2 tests.

6. Trench backfill shall be tested at each compacted initial and final backfill layer, at least once for each 150 ft. or less of trench length, but no fewer than 2 tests. 7. Test compaction of soils-in-place in accordance with ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D

8. Test Reporting: Test results must be reported to BSE and the general contractor in writing within 24 hours after testing, via fax. Reports must contain the project name, the date of the test and the location of the test.

1. Strength test cylinders shall be prepared for each day's pour of each concrete mix and at a minimum frequency of every 50 cu. yd. on all concrete placed. Conform to ASTM C39.

2. Four (4) test cylinders are to be made and cured on site for the first 24 hours. Test one of the specimens at 7 days and two at 28 days. Hold the fourth specimen in reserve for later testing if needed. 3. Slump, air content and temperature tests shall be conducted at a minimum when strength specimens are made

and at any other times as specified by the Engineer. 4. Perform slump tests on a representative concrete sample at the point of discharge. Perform additional tests when concrete consistency seems to have changed. The maximum allowable field slump is 5 inches. Conform to

5. Perform air content tests on all concrete specified to be air-entrained. Conform to ASTM C231.

6. Perform a temperature test every hour when air temperature is 40°F and below, or when air temperature is 80°F and above. Conform to ASTM C 1064.

7. Prior to the closing of forms or the delivery of concrete to the job site, the inspector shall verify that the reinforcing steel is in conformance with the city-approved plans, specifications and shop drawings. The inspector shall confirm that the reinforcing steel is of the correct size and grade and ensure that the proper spacing, clearances, splice lengths and embedded items have been provided. All reinforcing steel shall be in place prior to the placement of concrete and be secured against displacement.

8. The Inspector shall verify that the bolt size, location and embedment length of all anchor bolts are in conformance with the city-approved plans, specifications and shop drawings.

9. Anchor rods 3/4" or smaller may be floated in place following concrete placement, provided that anchor bolts are worked easily by hand into the fresh concrete to allow for full contact with the shank of the bolt. Bolts shall be placed by means of a template and shall be worked into concrete in vertical alignment.

placement, the location of concrete placement within the structure and the concrete mix design being used.

1. Bolts: Bolts that are not identified as being slip-critical nor in direct tension need not be inspected other than to verify that the plies of connected elements are brought into snug-tight condition in properly-aligned holes.

10. Test Reporting: Test results must be reported to BSE and the General Contractor in writing within 24 hours after

testing, via fax or email. Reports of compressive strength tests must contain the project name, the date of concrete

2. Field Welding: Inspection is required for single-pass fillet welds, multi-pass fillet welds, complete- and partialpenetration groove welds, floor and roof deck welding, and stairs and railing systems. Prior to the start of the work, materials, qualifications of welding procedures and welder qualifications shall be verified. Provide continuous o periodic inspection of the structural welding as indicated in Table 1704.3 of the referenced IBC. Inspections may occur periodically, as defined below. A visual inspection to ensure proper type, size, length and quality of all field

welds is required prior to work being concealed by other materials. 3. Periodic inspection: "Periodic" is defined as generally once a week at a minimum, and more often as needed to observe work requiring inspections, as outlined above, prior to being covered by subsequent construction.

connector stud welds shall be visually inspected. Bend tests shall be performed if visual inspections reveal less than a 360-degree flash or welding repairs to any shear connector stud. 5. Structural steel bar joists and metal buildings fabricated on the premises of a facility/plant not certified by a nationally recognized organization, shall have in-plant special inspections. AISC, ICBO, CWB and SJI are certified

4. Shear connector stud welds will be inspected and tested according to AWS D1.1 for stud welding. Shear

6. Test Reporting: Test results must be reported to BSE and the General Contractor in writing within 24 hours of testing, via fax or email. Reports must contain the project name, the date of the test and the location of the test.

- 1. Mortar properties, grout, brick, concrete masonry unit and prism tests and evaluations are to be performed during construction for each 5,000 sq. ft. of wall area or portion thereof.
- 2. Mortar properties are to be tested per ASTM C 780. 3. Grout will be sampled and tested for compressive strength per ASTM C 1019.

prior to closing cleanouts, and during all grouting operations.

- 4. Brick tests for each type and grade of brick indicated are to be performed according to ASTM C 67.
- 5. Concrete masonry unit tests for each type of concrete masonry unit indicated are to be performed per ASTM C

6. Masonry prisms are to be tested per ASTM C 1314. Prepare one (1) set of prisms for testing at 7 days and one (1) 7. Special inspection of masonry construction is required during preparation and taking of any required prisms or test specimens, placing of all masonry units, placement of reinforcement and inspection of grout space immediately

8. Test Reporting: Test results must be reported to BS and the general contractor in writing within 24 hours of testing, via fax. Reports must contain the project name, the date of the test and the location of the test.

Туре	Continuous Special Inspection	Periodic Special Inspection	Referenced Standard
Material verification of cold-formed steel deck:			
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	-	х	Applicable ASTM material standards
b. Manufacturer's certified test reports.	-	х	
2. Inspection of welding and attachment:			
a. Cold-formed steel deck:			
1. Floor and roof deck welds and other means of attachment.	-	х	AWS D1.3
b. Reinforcing steel:			
1. Verification of edibility of reinforcing steel other than ASTM A 706.	-	Х	AWS D1.4
Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of	Х	-	ACI 318: Section 3.5.2
concrete and shear reinforcement.	Х	-	
3. Shear reinforcement.	-	Х	
4. Other reinforcing steel.			

Required Special Inspections and Tests of C	Concrete Construct	tion Per IBC	Table 1705.3
Туре	Continuous Special Inspection	Periodic Special Inspection	Referenced Standard
. Inspect reinforcement, including prestressing endons, and verify placement.	-	х	ACI 318 Chp. 20, 25.2, 25.3, 26.6.126.6.3.
Reinforcing bar welding: a. Verify weldability of reinforcing bars other than ASTM A706 b. Inspect single-pass fillet welds,	-	x	AWS D1.4 ACI 318: 26.6.4
aximum 5/16"; and c. Inspect all other welds.	X	X	
. Inspect another wetus:	-	X	ACI 318: 17.8.2
. Inspect anchors post-installed in hardened concrete members a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	X	-	ACI 318: 17.8.2.4
b. Mechanical anchor and adhesive anchors of defined in 4.a.	-	x	ACI 318: 17.8.2.
. Verify use of required design mix.	-	х	ACI 318: Chp. 19, 26.4.3, 26.4.4
Prior to concrete placement, fabricate becimens for strength tests, perform slump and r content tests, and determine the temperature the concrete.	Х	-	ASTM C172 ASTM C31 ACI 318: 26.4, 26.12
. Inspect concrete and shotcrete placement for oper application techniques.	Х	-	ACI 318: 26.5
. Verify maintenance of specified curing emperatures and techniques.	-	х	ACI 318: 26.5.3-26.5.5
Inspect prestressed concrete for: a. Application of prestressing forces; and b. Grouting of bonded prestressing tendons.	X X	-	ACI 318: 26.10
0. Inspect erection of precast concrete members.	-	х	ACI 318: Chp. 26.8
Verify in-situ concrete strength, prior to ressing of tendons in post-tensioned concrete and prior to removal of shores and forms from eams and structural slabs.	-	х	ACI 318: 26.11.2
Inspect framework for shape, location and mensions of the concrete member being	-	х	ACI 318: 26.11.1.2(B)

a. Where applicable, see also Section 1705.12, Special inspections for seismic resistance. b. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with 17.8.2 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

Required Special Inspections and Tests of Soils Per IBC Table 1705.6			
Туре	Continuous Special Inspection	Periodic Special Inspection	
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	-	Х	
2. Verify excavations are extended to proper depth and have reached proper material.	-	Х	
3. Perform classification and testing of compacted fill materials.	-	Х	
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	Х	-	
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	-	Х	

Туре	Continuous Special Inspection	Periodic Specia Inspection
Verify element materials, sizes and lengths comply with the requirements.	х	-
Determine capacities of test elements and conduct additional load tests, as required.	Х	-
3. Inspect driving operations and maintain complete and accurate records for each element.	х	-
4. Verify placement locations and plumbness, confirm type size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element.	х	-
5. For steel elements, perform additional special inspections in accordance with Section 1705.2.	-	-
6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance with Section 1705.3.	-	-
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge.	-	-

Туре	Continuous Special Inspection	Periodic Special Inspection
Inspect drilling operations and maintain complete and accurate records for each element.	х	-
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate endbearing strata capacity. Record concrete or grout volumes.	х	-
3. For concrete elements, perform tests and additional special nspections in accordance with Section 1705.3.	-	-

Required Quality Control Inspections (GCI) & Quality Assurance Inspections (QAI) of Steel Construction Per AISC 360, Specification Chapter M & N				
Туре	Frequency of Inspections	Referenced Standard		
. The fabricator's QCI shall inspect the following as a minimum, as oplicable:		AISC 360 Chp. M & N TABLE N5.4-1		
a. Shop welding, high strength bolting and details in cordance with AISC 360, Section N5.	Per AISC	TABLE N5.4-2 TABLE N5.4-3		
b. Shop cut and finished surfaces in accordance with AISC 360, ection M2.	Per AISC	TABLE N5.6-1 TABLE N5.6-2		
c. Shop heating for straightening, cambering and curving in coordance with AISC 360, Section M2.1.	Per AISC	TABLE N5.6-3 TABLE N6.1		
d. Tolerances for shop fabrication in accordance with ne Code of Standard Practice, Section 6.	Per AISC	Code of Standard Practice Sec. 6		
The erector's QCI shall inspect the following as a minimum, as oplicable:				
a. Field welding, high strength bolting and details in accordance with AISC 360, Section N5.	Per AISC	AISC 360 Chp. M&N TABLE N5.4-1		
b. Steel deck and headed steel stud anchor placement and stachment in accordance with AISC 360, Section N6.	Per AISC	TABLE N5.4-2 TABLE N5.4-3		
c. Field cut surfaces in accordance with AISC 360, Section 12.2.	Per AISC	TABLE N5.6-1 TABLE N5.6-2		
d. Field heating for straightening in accordance with AISC 360, ection M2.1.	Per AISC	TABLE N5.6-3 TABLE N6.1		
e. Tolerances for field erection in accordance with the Code of Standard Practice, Section 7.13.	Per AISC	Code of Standard Practice Sec. 6		
QAI shall be performed by others. All required inspection and non-destructive testing, as applicable, shall be in accordance with AISC 360	Per AISC & IBC	AISC 360 Chp. M&N		

ABBREVIATIONS LIST Sheet Number S0.0 S1.1 **EQUALS** S2.1 **GREATER THAN** GREATER THAN OR EQUAL TO LESS THAN S4.2 LESS THAN OR EQUAL TO MINUS. NEGATIVE PLUS OR MINUS ABOVE FINISHED FLOOR ALTERNATE ARCH. ARCHITECT BLDG. BUILDING BEAM BOTTOM OF STEEL BOTTOM CONTROL/CONSTRUCTION JOINT CENTER LINE C.M.U. CONCRETE MASONRY UNIT MATERIALS LEGEND CLG. CEILING CLR. CLEAR COLUMN CONC. CONCRETE CONT. CONTINUOUS

CONCRETE COORD. COORDINATE CTR. CENTER DIAMETER DOWN DRAWING EXPANSION JOINT GROUT E.O.R. ENGINEER OF RECORD EACH ELEVATION ELEV. ELEVATION ENGINEER EQUAL EQUIP. EQUIPMENT ET CETERA EXIST. EXISTING EXTERIOR FACE FOOTING BEARING ELEVATION FINISHED FLOOR ELEVATION FAR SIDE FOOT/FEET FOOTING/FOUNDATION GENERAL CONTRACTOR GALV. GALVANIZED GYPSUM HORIZ. HORIZONTAL INCHES IOIST BEARING FLEVATION KIPS PER SQUARE INCH LINEAR FEET POUND LONG LEG HORIZONTAL LONG LEG VERTICAL M.B.M. METAL BUILDING MANUFACTURER M.E.P. MECHANICAL ELECTRICAL PLUMBING MAX. MAXIMUM MINIMUM MISCELLANEOUS NOT APPLICABLE NEAR SIDE NOT TO SCALE

J.B.E.

DIAMETER

PLATE

REQUIRED

SIMILAR

SPACING

SOUARE

T.O.W. TOP OF WALL

SQUARE FEET

SPECIFICATION

TOP OF STEEL

THROUGH

TYPICAL

VERTICAL

WEIGHT

WITH

WITHOUT

REINF. REINFORCED

REQ'D.

SIM.

T.O.C.

T.O.F.

T.O.S.

THRU.

VERT.

WT.

W/O

TYP.

GYPSUM **INSULATION - RIGID** MASONRY - BRICK MASONRY - CMU **PLYWOOD** TILT / PRE-CAST SYMBOLS LEGEND P.E.M.B. PRE-ENGINEERED METAL BUILDING POUNDS PER SQUARE FOOT POUNDS PER SQUARE INCH TOP OF CONCRETE TOP OF FOOTING U.N.O. UNLESS NOTED OTHERWISE W.W.F. WELDED WIRE FABRIC

SHEET LIST Sheet Name **GENERAL NOTES** ISOMETRIC FOUNDATION PLAN ROOF FRAMING PLAN TYPICAL FOUNDATION DETAILS FOUNDATION DETAILS TYPICAL FRAMING DETAILS TYPICAL FRAMING DETAILS FRAMING DETAILS

LENEXA KS

REVISIONS

08/06/21

Project No.: 19050.01 Issued For: PERMIT SET

- DRAWING NUMBER

-SHEET NUMBER

- AREA OF DETAIL

<u>ELEVATION</u>

- DRAWING NUMBER

- DRAWING NUMBER

BEAM DESIGNATION

- SHEAR STUD COUNT

COLUMN DESIGNATION

FOOTING DESIGNATION

BEAM TYPE & SIZE

- COLUMN SIZE

- COLUMN TYPE

— FOOTING MARK

— BEARING ELEVATION

PIER DESIGNATION

— TOP OF PIER ELEVATION

— FOOTING MARK

COLUMN GRID

-GRID DESIGNATION

MOMENT CONNECTION

REVISION DESIGNATION

JOIST BEARING ELEVATION

SLAB THICKNESS TRANSITION

NORTH ARROW

CAMBER OF BEAM IN INCHES

-SHEET NUMBER

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE HOERR SCHAUDT / LANDSCAPE BSE STRUCTURAL FOUNDATIONS STRUCTURAL BSE STRUCTURAL ENGINEERS PLUMBING HENDERSON **ENGINEERS MECHANICAL** HENDERSON **ENGINEERS** HENDERSON ELECTRICAL **ENGINEERS**

> Lenexa, Kansas 66214 Phone 913.492.7400 www.BSEstructural.com

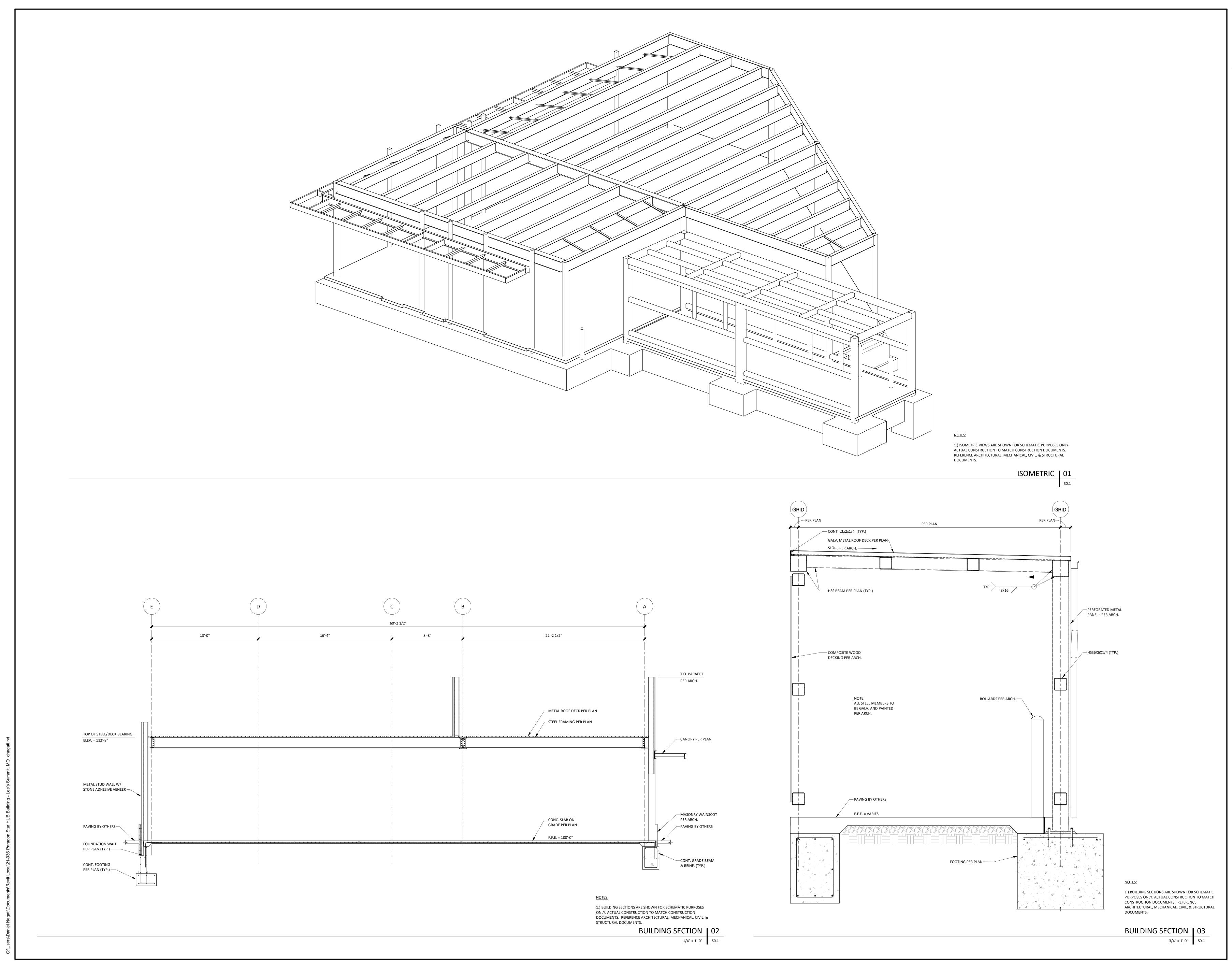
> > Project Number 21-036

FIRE PROTECTION FIRE PROTECTION

CONTRACTOR FOGEL ANDERSON

SHEET TITLE

GENERAL





LENEXA KS

 Project No.:
 19050.01

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 Date
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REGISTRATION

OF MISSO

STEVEN N.

BUSEY

NUMBER

E-25462

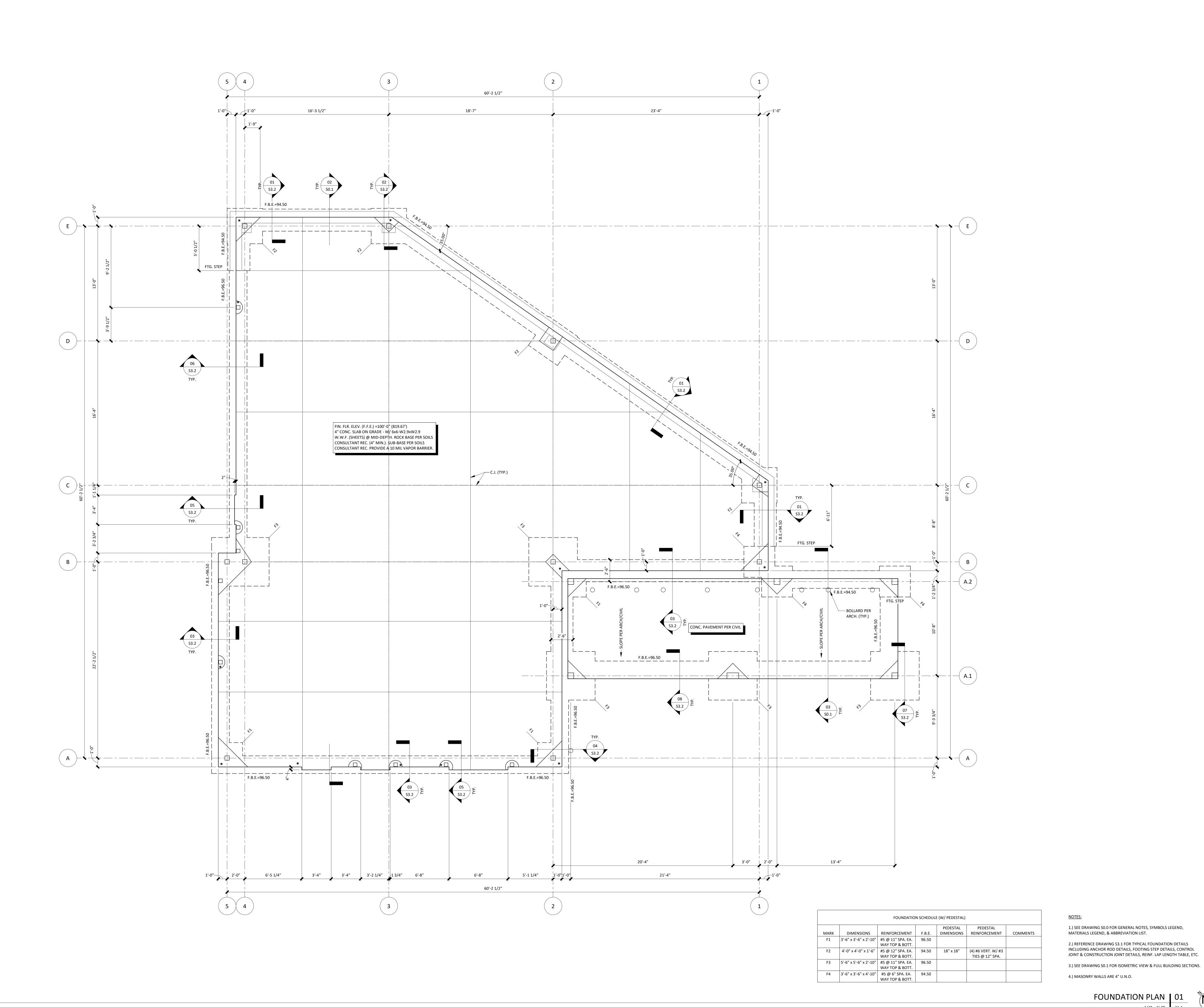
PROJECT TEAM ARCHITECT FINKLE+WILLIAMS ARCHITECTURE CIVIL HOERR SCHAUDT / LANDSCAPE FOUNDATIONS BSE STRUCTURAL ENGINEERS STRUCTURAL **BSE STRUCTURAL ENGINEERS** HENDERSON ENGINEERS PLUMBING HENDERSON MECHANICAL **ENGINEERS** HENDERSON ELECTRICAL **ENGINEERS** FIRE PROTECTION FIRE PROTECTION CONTRACTOR FOGEL ANDERSON



Project Number 21-036

SHEET TITLE

ISOMETRIC



PARAGON STAR

LOT 20 - HUB BUILDING

LENEXA KS

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT

HOERR SCHAUDT /

FOUNDATIONS BSE STRUCTURAL

STRUCTURAL BSE STRUCTURAL **ENGINEERS** PLUMBING HENDERSON

ENGINEERS HENDERSON MECHANICAL **ENGINEERS**

ELECTRICAL

ENGINEERS FIRE PROTECTION FIRE PROTECTION

HENDERSON

CONTRACTOR FOGEL ANDERSON

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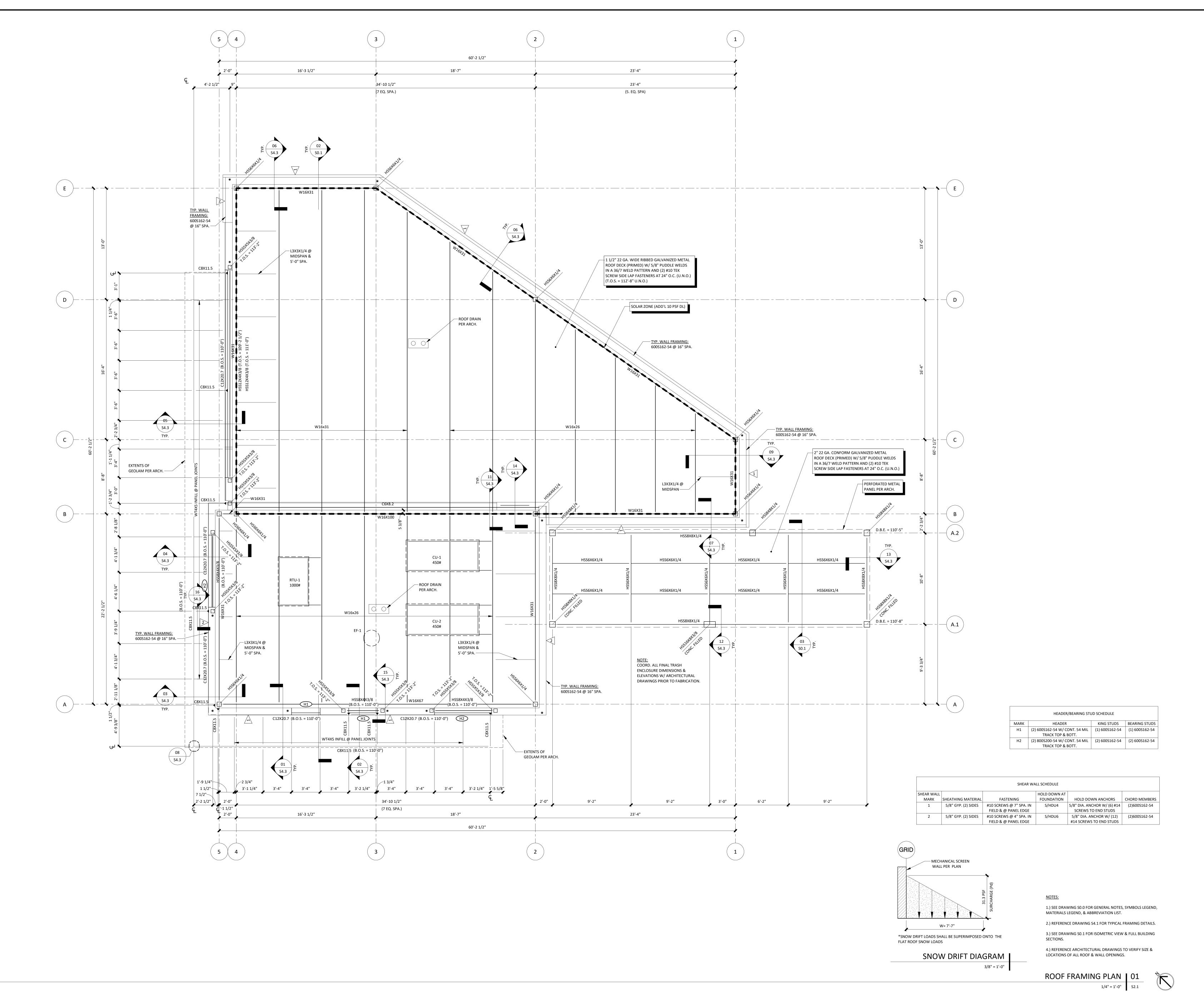
SHEET TITLE

FOUNDATION PLAN

SHEET NUMBER

FOUNDATION PLAN 01

1/4" = 1'-0" S1.1





LENEXA KS

 Project No.:
 19050.01

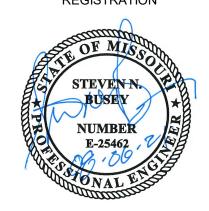
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STRUCTURAL ENGINEERS

1132 West 79th Street Lenexa, Kansas 66214

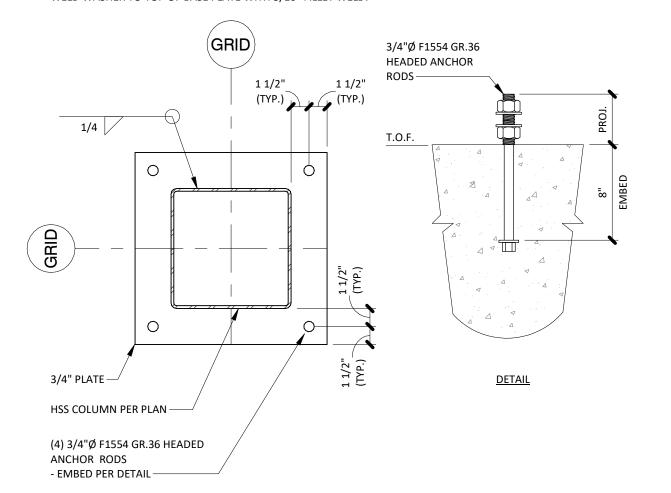
Phone 913.492.7400

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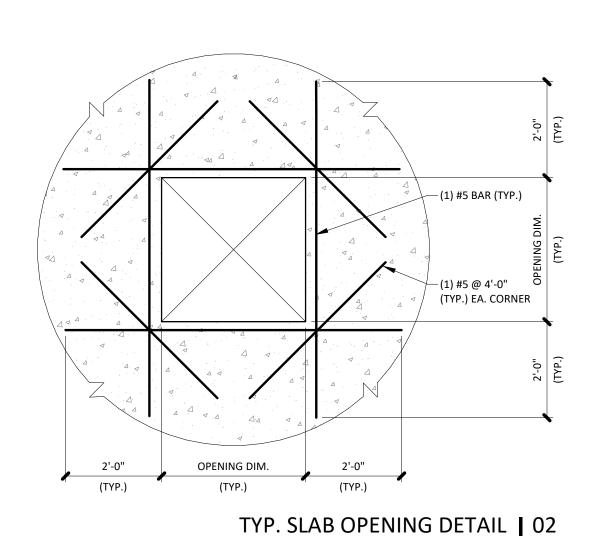
CONTRACTOR FOGEL ANDERSON

SHEET TITLE

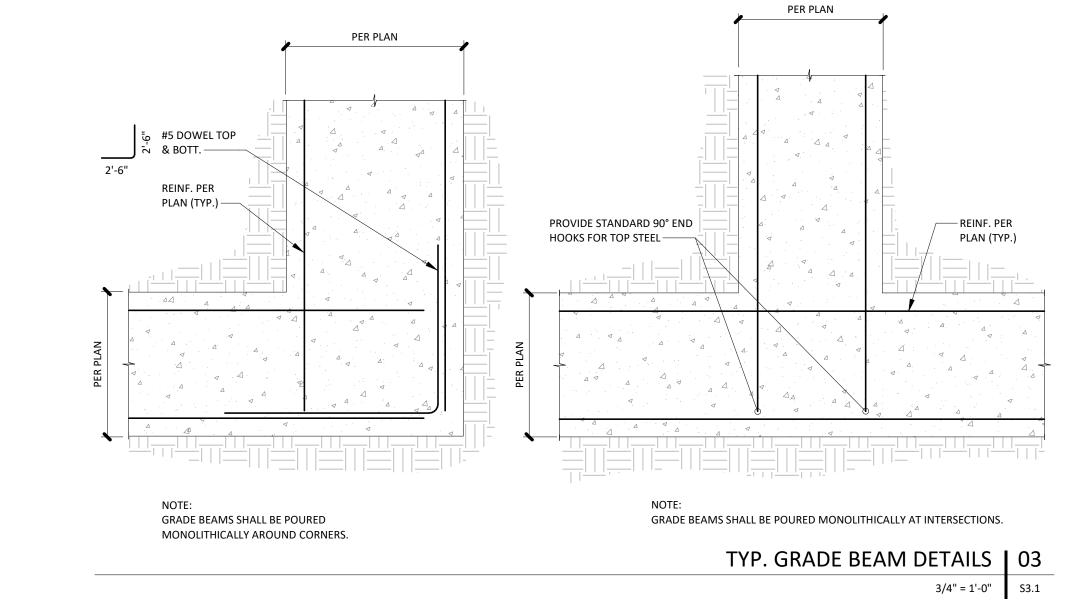
ROOF FRAMING PLAN

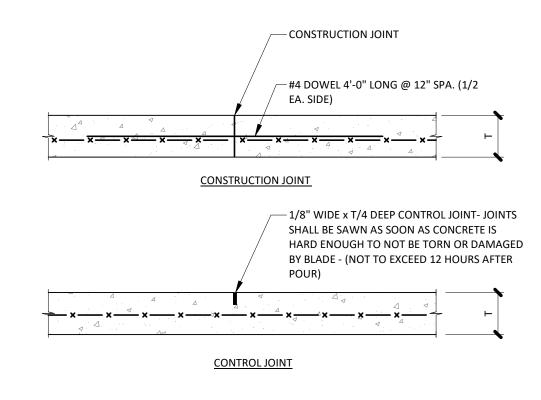


TYP. ANCHOR ROD & BASE PLATE DETAIL 01



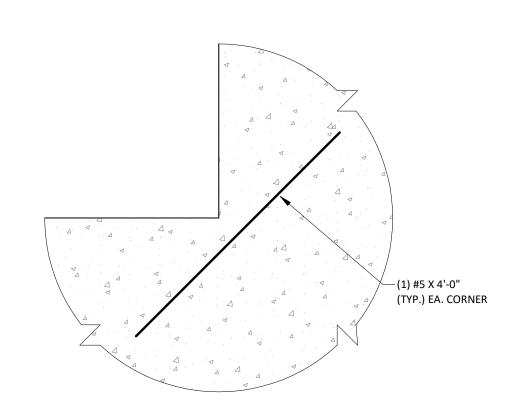
1/2" = 1'-0" S3.1





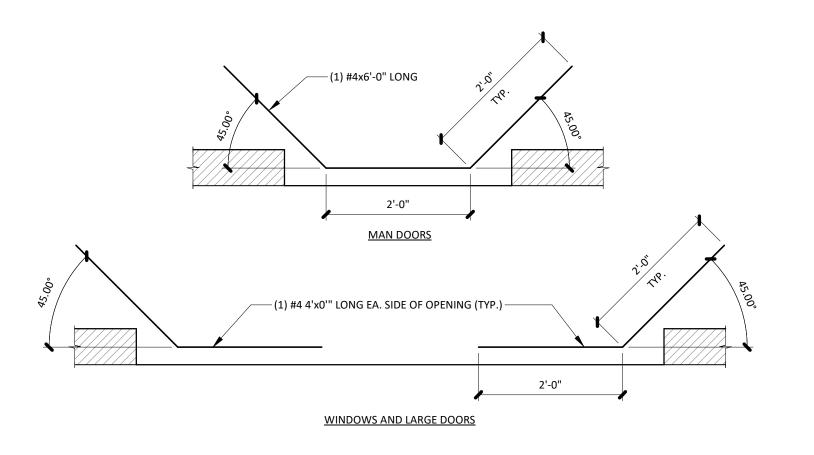
TYP. CONTROL & CONST. JOINT DETAIL 04

STANDARD HOOK	TABLE
BAR SIZE	ноок
#4	8 in.
#5	10 in.
#6	12 in.
#7	14 in.
#8	16 in.

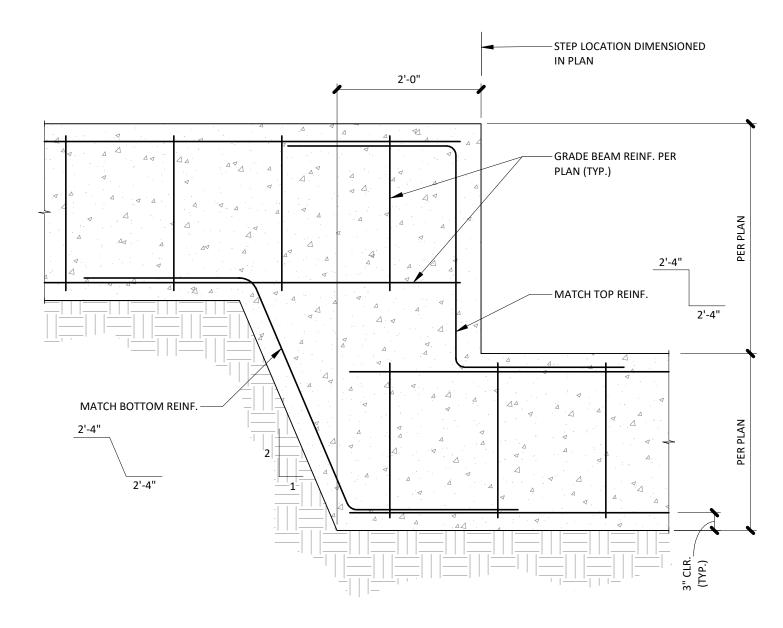


TYP. RE-ENTRANT CORNER REINF. DETAIL 06

3/4" = 1'-0" \$3.1



TYP. SLAB REINF. @ DOOR DETAIL	07
3/4" = 1'-0"	S3.1



TYP. FOOTING STEP DETAIL	08
3/4" = 1'-0"	S3.1

		ION LAP SF RADE 60 UI f'c=3		. ,	
BAR	LAP	ТОР	BARS	OTHER	R BARS
SIZE	CLASS	CASE 1	CASE 2	CASE 1	CASE 2
	Α	22	32	17	25
#3	В	28	42	22	32
#4	Α	29	43	22	33
#4	В	37	56	29	43
μг	А	36	54	28	41
#5	В	47	70	36	54
#6	Α	43	64	33	50
#0	В	56	84	43	64
#7	Α	63	94	48	72
#/	В	81	122	63	94
#8	Α	72	107	55	82
#0	В	93	139	72	107
#9	Α	81	121	62	93
#9	В	105	157	81	121
#10	Α	91	136	70	105
#10	В	118	177	91	136
#11	А	101	151	78	116
#11	В	131	196	101	151

	NOTES.
	TABULATED VALUES ARE BASED ON GRADE 60 REINFORCING BARS AND NORMAL-WEIGHT CONCRETE.
2	2. TENSION DEVELOPMENT LENGTHS AND TENSION LAP SPLICE LENGTHS ARE BASED ON ACI 318, SECTIONS 12.2.2 AND 12.15, RESPECTIVELY.
	3. TABULATED VALUES FOR BEAMS OR COLUMNS ARE BASED ON TRANSVERSI REINFORCEMENT AND CONCRETE COVER MEETING MINIMUM CODE REQUIREMENTS. LENGTHS ARE IN INCHES.
	4. CASES 1 AND 2, WHICH DEPEND ON THE TYPE OF STRUCTURAL ELEMENT, CONCRETE COVER, AND THE CENTER-TO-CENTER SPACING OF THE BARS ARE DEFINED AS:
7	BEAMS OR COLUMNS: CASE 1: COVER AT LEAST (1) BAR DIAMETER AND CC. SPACING AT LEAST (2) BAR DIAMETERS
1	CASE 2: COVER LESS THAN (1) BAR DIAMETER AND CC. SPACING LESS THAN (2) BAR DIAMETERS
5 5	ALL OTHERS: CASE 1: COVER AT LEAST (1) BAR DIAMETER AND CC. SPACING AT LEAST (3) BAR DIAMETERS

CASE 2: COVER LESS THAN (1) BAR DIAMETER AND CC. SPACING LESS THAN (3) BAR DIAMETERS
5. LAP CLASS A VALUES ARE THE REQUIRED TENSION DEVELOPMENT LENGTH Id; LAP SPLICE LENGTHS ARE MULTIPLES OF TENSION DEVELOPMENT LENGTHS CLASS A - 1.0ld AND CLASS B = 1.3ld (ACI 318, SECTION 12.15.1)
6. LAP CLASS B SHALL BE USED FOR ALL CASES UNLESS APPROVED BY E.O.R

 LAP CLASS B SHALL BE USED FOR ALL CASES UNLESS APPROVED BY E.O.R
 TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE BARS.

8.) LENGTHS SHOWN ARE FOR UNCOATED BARS. LENGTHS SHOWN SHALL BE MULTIPLIED BY 1.2 FOR ALL EXPOXY COATED BARS (ACI 318 SECTION 12.2.4)9.) WHEN BARS OF DIFFERENT SIZES ARE LAP SPLICED, THE SPLICE LENGTH FOR THE LARGER BAR SHALL BE USED.

LAP SPLICE LENGTHS f'c=3000 psi 09

1/2" = 1'-0"

CONCRETE COMPRESSIVE STRENGTH	
SIZE 3000 PSI 4000 PSI 5000 PSI	
DEV SPLICE DEV SPLICE DEV SPLICE #3 9 12 8 12 7 12	
	ICE
#4 11 1F 10 1F 0 1F	,
#4 11 15 10 15 9 15	;
#5 14 19 12 19 12 19)
#6 17 23 15 23 14 23	}
#7 20 27 17 27 16 27	7
#8 22 30 19 30 18 30)
#9 25 34 22 34 21 34	ļ
#10 28 39 25 39 23 39)
#11 31 43 27 43 26 43	3

- 1.) TABULATED VALUES ARE BASED ON GRADE 60 REINFORCING BARS AND NORMAL
- 2.) COMPRESSION DEVELOPMENT LENGTHS AND COMPRESSION SPLICE LENGTHS ARE BASED ON ACI 318, SECTIONS 12.3 AND 12.16, RESPECTIVELY.
- 3.) ALL VALUES ARE SHOWN IN INCHES4.) COMPRESSION SPLICE PERMISSIBLE ONLY WHERE SPECIFICALLY NOTED5.) TABLE IS NOT APPLICABLE FOR EPOXY-COATED REINFORCEMENT.
- 5.) TABLE IS NOT APPLICABLE FOR EPOXY-COATED REINFORCEMENT.
 6.) "SIDE LAP" ALL LAP SPLICES TO MAINTAIN SPECIFIED CONCRETE COVER.
- 7.) WHEN BARS OF A DIFFERENT SIZE ARE LAP SPLICED, THE SPLICE LENGTH SHALI BE THE LARGER OF THE DEVELOPMENT LENGTH OF THE LARGER BAR, OR THE SPLICE LENGTH OF THE SMALLER BAR.

COMPRESSION DEVEL. & LAP SPLICE TABLE 10

1/2" = 1'-0" \$3.1

	GI	RADE 60 UI f'c=4	NCOATED E	BARS			
BAR	LAP	ТОР	BARS	OTHER BARS			
SIZE	CLASS	CASE 1	CASE 2	CASE 1	CASE 2		
"2	Α	19	28	15	22		
#3	В	24	36	19	28		
#4	Α	25	37	19	29		
#4	В	32	48	25	37		
4г	Α	31	47	24	36		
#5	В	40	60	31	47		
#6	Α	37	56	29	43		
#0	В	48	72	37	56		
#7	Α	54	81	42	63		
#/	В	70	106	54	81		
#8	Α	62	93	48	72		
#0	В	80	121	62	93		
40	Α	70	105	54	81		
#9	В	91	136	70	105		
#10	Α	79	118	61	91		
#10	В	102	153	79	118		
#11	Α	87	131	67	101		
#11	В	113	170	87	131		

TENSION LAP SPLICE LENGTHS (in)

1. TABULATED VALUES ARE BASED ON GRADE 60 REINFORCING BARS AND NORMAL-WEIGHT CONCRETE.

TENSION DEVELOPMENT LENGTHS AND TENSION LAP SPLICE LENGTHS ARE BASED ON ACI 318, SECTIONS 12.2.2 AND 12.15, RESPECTIVELY.
 TABULATED VALUES FOR BEAMS OR COLUMNS ARE BASED ON TRANSVERSE

REINFORCEMENT AND CONCRETE COVER MEETING MINIMUM CODE REQUIREMENTS. LENGTHS ARE IN INCHES.

4. CASES 1 AND 2, WHICH DEPEND ON THE TYPE OF STRUCTURAL ELEMENT, CONCRETE COVER, AND THE CENTER-TO-CENTER SPACING OF THE BARS ARE

4. CASES 1 AND 2, WHICH DEPEND ON THE TYPE OF STRUCTURAL ELEMENT, CONCRETE COVER, AND THE CENTER-TO-CENTER SPACING OF THE BARS ARE DEFINED AS:

BEAMS OR COLUMNS:

CASE 1: COVER AT LEAST (1) BAR DIAMETER AND
C.-C. SPACING AT LEAST (2) BAR DIAMETERS

CASE 2: COVER LESS THAN (1) BAR DIAMETER AND C.-C. SPACING LESS THAN (2) BAR DIAMETERS

ALL OTHERS:

CASE 1: COVER AT LEAST (1) BAR DIAMETER AND

C.-C. SPACING AT LEAST (3) BAR DIAMETERS

CONCRETE CAST BELOW THE BARS.

CASE 2: COVER LESS THAN (1) BAR DIAMETER AND

C.-C. SPACING LESS THAN (3) BAR DIAMETERS

5. LAP CLASS A VALUES ARE THE REQUIRED TENSION DEVELOPMENT LENGTHS, Id; LAP SPLICE LENGTHS ARE MULTIPLES OF TENSION DEVELOPMENT LENGTHS; CLASS A - 1.0Id AND CLASS B = 1.3Id (ACI 318, SECTION 12.15.1)

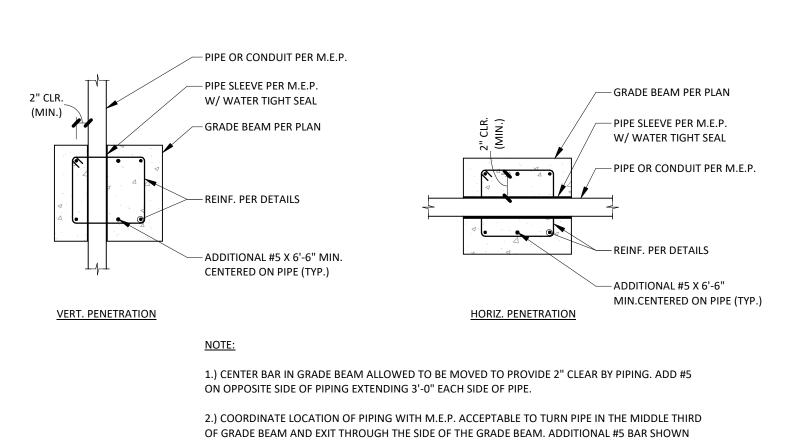
6. LAP CLASS B SHALL BE USED FOR ALL CASES UNLESS APPROVED BY E.O.R7. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF

8.) LENGTHS SHOWN ARE FOR UNCOATED BARS. LENGTHS SHOWN SHALL BE MULTIPLIED BY 1.2 FOR ALL EXPOXY COATED BARS (ACI 318 SECTION 12.2.4)

9.) WHEN BARS OF DIFFERENT SIZES ARE LAP SPLICED, THE SPLICE LENGTH FOR THE LARGER BAR SHALL BE USED.

LAP SPLICE LENGTHS f'c=4000 psi 11

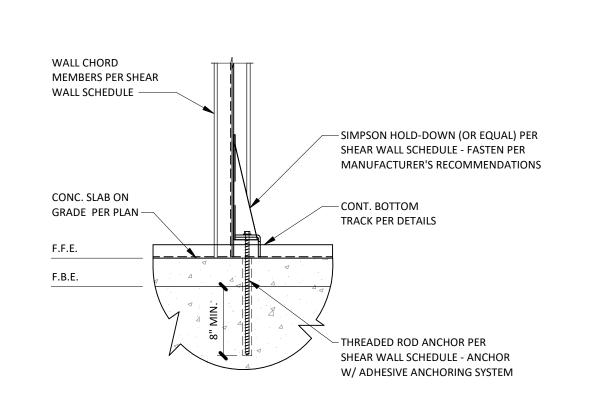
1/2" = 1'-0" \$3.1



ONLY REQUIRED WHEN PIPING PASSES THROUGH TOP OR BOTTOM OF GRADE BEAM.

TYPICAL GRADE BEAM PENETRATION DETAILS 12

3/4" = 1'-0" \$3.1



TYP. HOLD-DOWN DETAIL 13

3/4" = 1'-0" 53.1

PARAGON STAR

LOT 20 - HUB BUILDING

LENEXA KS

Date: 08/06/21

Issued For: PERMIT SET

REVISIONS

Project No.: 19050.01

STEVEN N.
BUSEY
NUMBER
E-25462

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE HOERR SCHAUDT / LANDSCAPE FOUNDATIONS BSE STRUCTURAL **ENGINEERS** BSE STRUCTURAL STRUCTURAL **ENGINEERS** HENDERSON PLUMBING **ENGINEERS** MECHANICAL HENDERSON **ENGINEERS** HENDERSON ELECTRICAL

FIRE PROTECTION FIRE PROTECTION

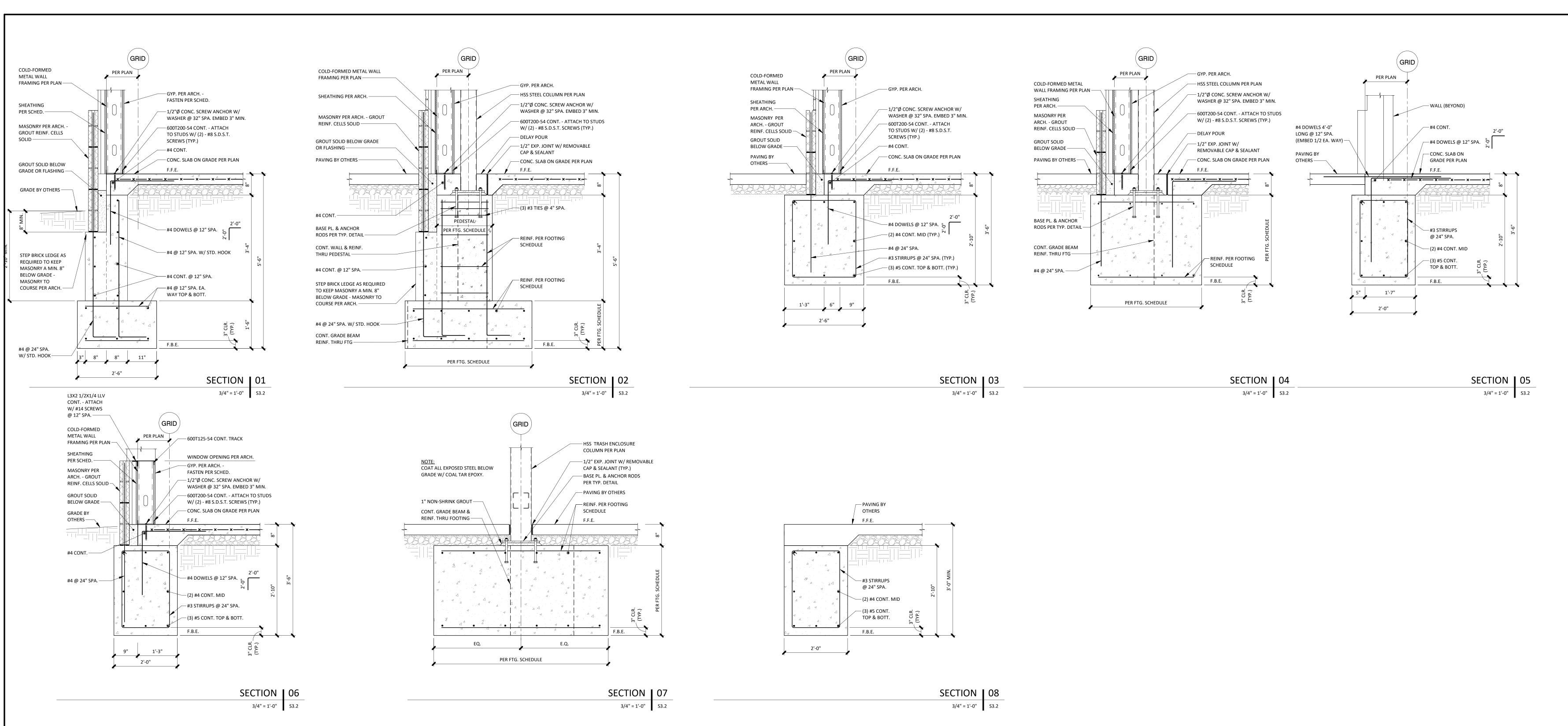
CONTRACTOR FOGEL ANDERSON

ENGINEERS

1132 West 79th Street Lenexa, Kansas 66214 Phone 913.492.7400 www.BSEstructural.com

Project Number 21-036

TYPICAL FOUNDATION DETAILS





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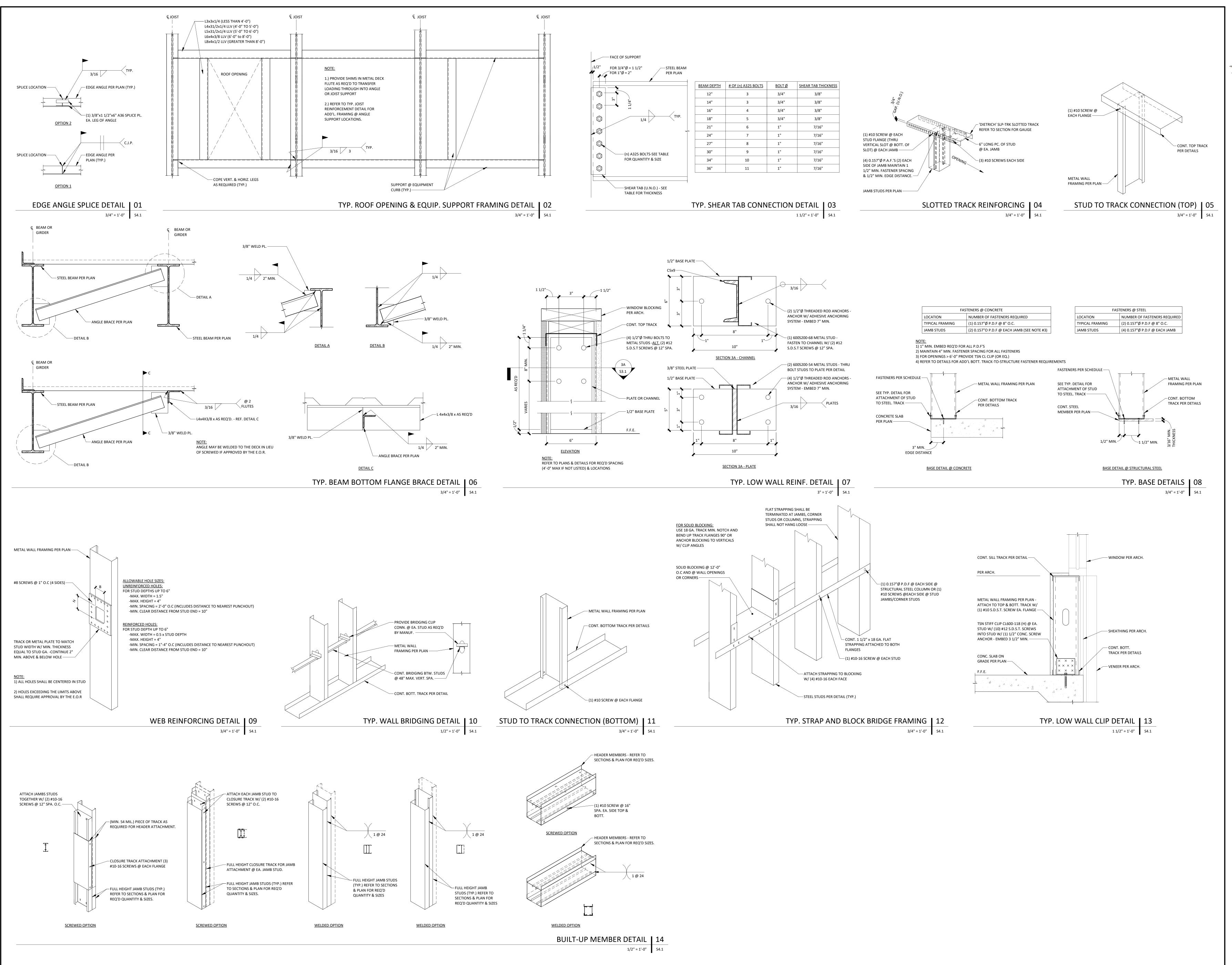
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FOUNDATION **DETAILS**





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SHEET TITLE

TYPICAL
FRAMING

1132 West 79th Street

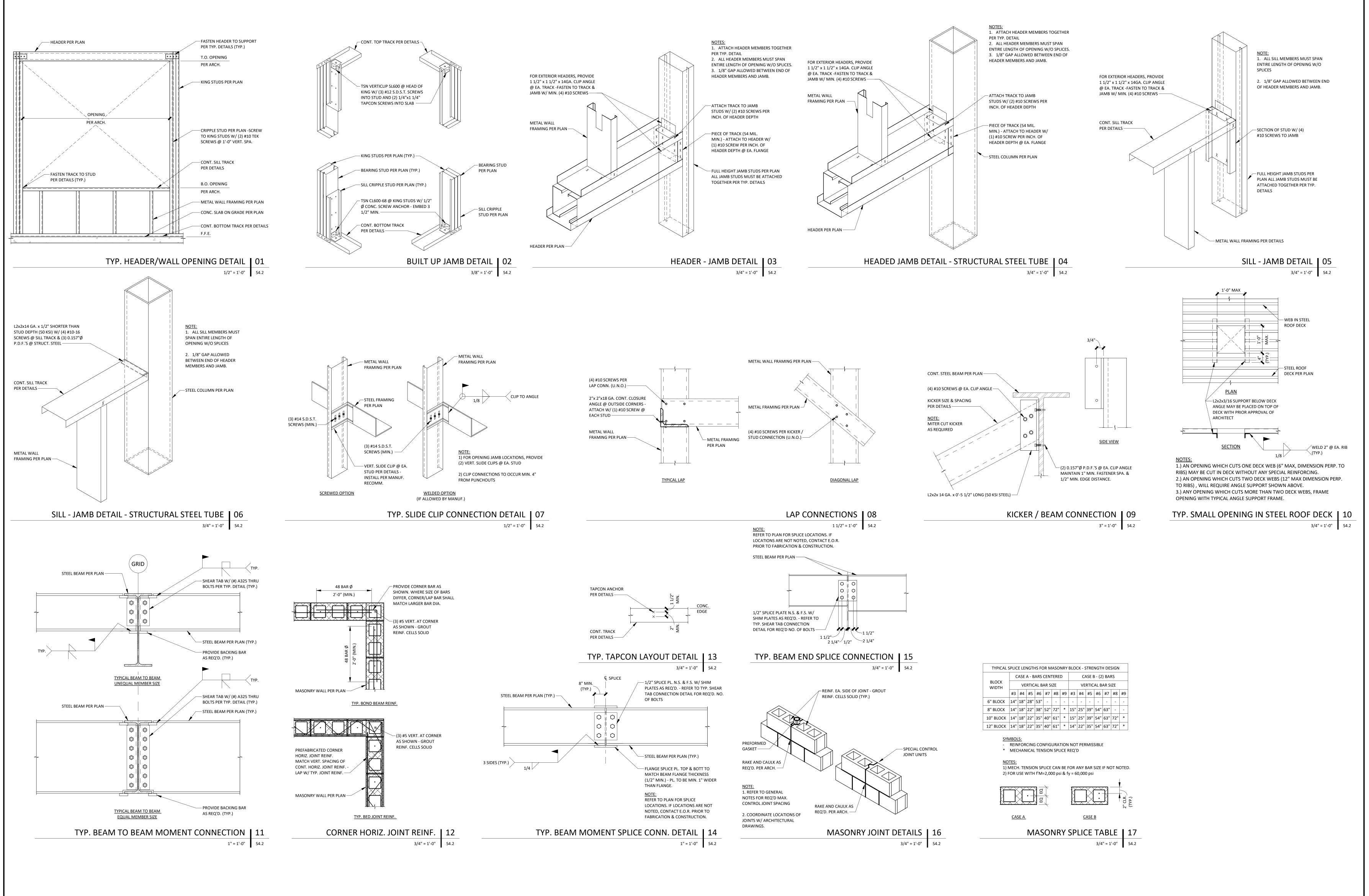
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DETAILS



PARAGON STAR

LOT 20 - HUB BUILDING

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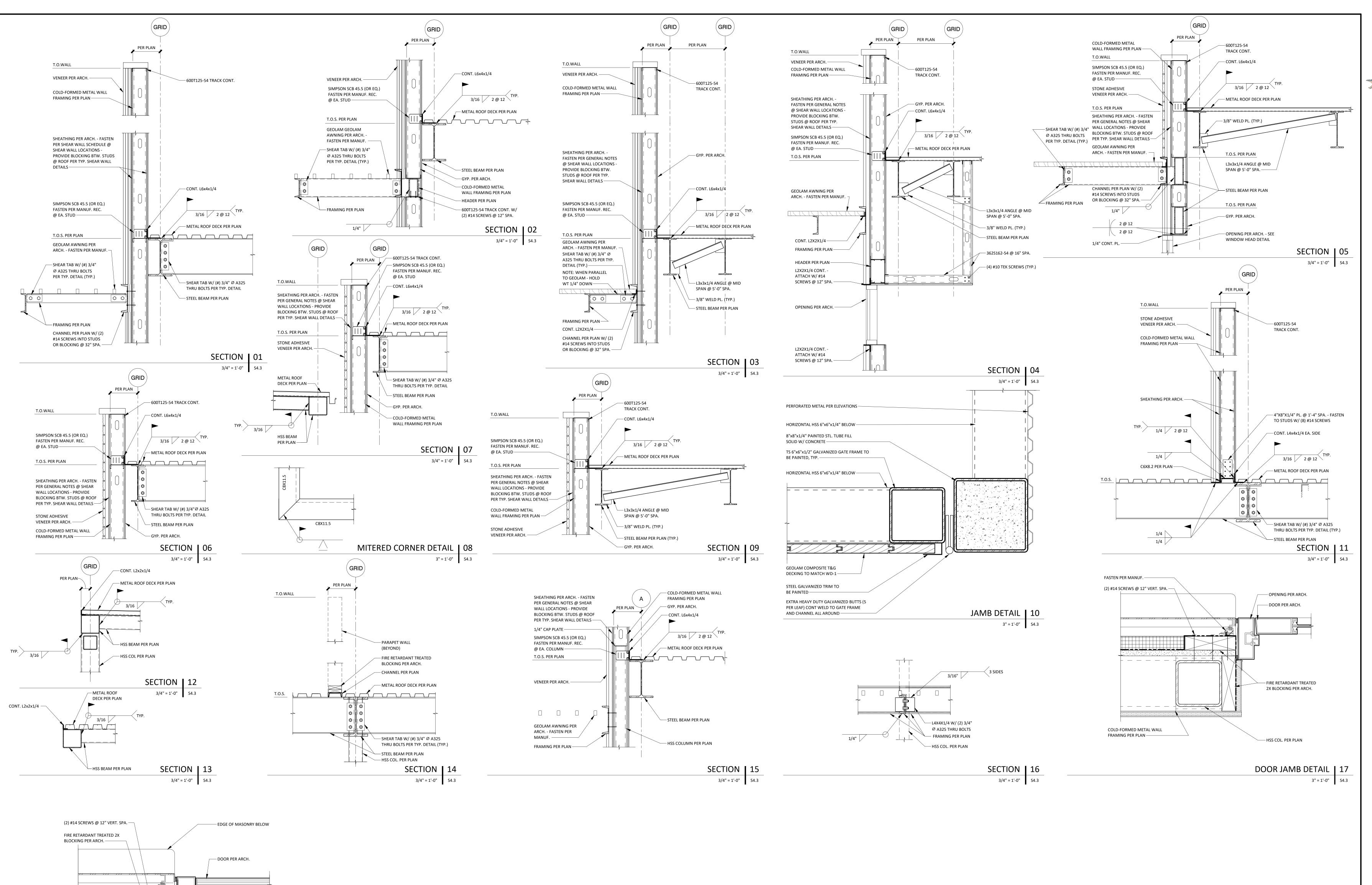
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TYPICAL FRAMING DETAILS

S4 2



SHEATHING PER ARCH. - FASTEN
PER SHEAR WALL SCHEDULE ——

DOOR JAMB DETAIL 18

3" = 1'-0" \$4.3

JAMB STUDS PER SCHEDULE —



LOT 20 - HUB BUILDING

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NUMBER

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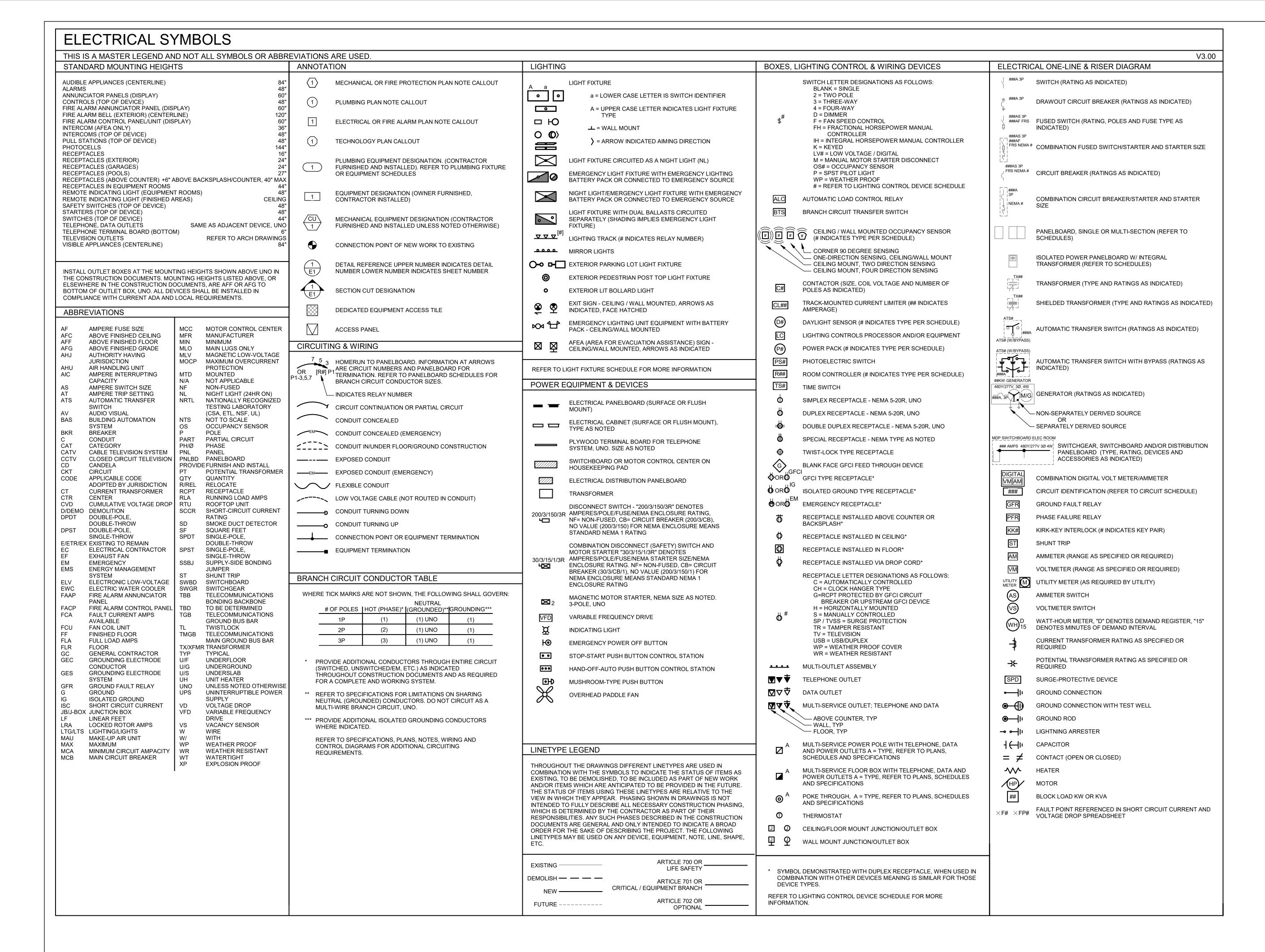


Project Number 21-036

SHEET TITLE

FRAMING DETAILS

S4.3



APPLICABLE ELECTRICAL CODES:

NOTE: PROJECT IS DESIGNED IN COMPLIANCE WITH THE FOLLOWING CODES. THIS IS NOT AN EXHAUSTIVE LIST. PROJECT SHALL COMPLY WITH ALL APPLICABLE CODES, STANDARDS AND LOCAL REQUIREMENTS. REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE, (NFPA 70) BUILDING CODE: 2018 INTERNATIONAL BUILDING CODE ENERGY CODE: 2018 INTERNATIONAL ENERGY CONSERVATION CODE

COMMISSIONING / FUNCTIONAL TESTING:

CONTRACTOR'S BID SHALL INCLUDE PROVISIONS TO PROVIDE ALL SERVICES RELATED TO THE CODE REQUIRED BUILDING SYSTEMS COMMISSIONING INCLUDING A COMMISSIONING PLAN, FUNCTIONAL TESTING, AND RELATED DOCUMENTATION, REPORTS AND OWNER TRAINING. THIS INCLUDES RETAINING THE SERVICES OF A 3RD PARTY REGISTERED DESIGN PROFESSIONAL OR APPROVED AGENCY. REFER TO THE LATEST ADOPTED EDITION OF THE APPLICABLE ENERGY CODE FOR MORE INFORMATION. CONTRACTOR SHALL COMPLETE ALL RELATED COMMISSIONING REQUIREMENTS PRIOR TO FINAL INSPECTIONS IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS, CODE AND MANUFACTURER'S INSTRUCTIONS.

ELECTRICAL SUPPLEMENTAL SPECIFICATIONS:

1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS. AS APPLICABLE, REVIEW THE LANDLORD CRITERIA, GENERAL NOTES, OTHER TRADE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.

- 2. ALL WORK SHALL CONFORM TO ALL LOCAL CODES AND ORDINANCES AS WELL AS APPLICABLE INDUSTRY STANDARDS. ALL EQUIPMENT SHALL BEAR LABELS FOR THE USE INTENDED BY AN AHJ ACCEPTED NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), SUCH AS UL OR ETL. THE FINAL ELECTRICAL INSTALLATION OF THE FACILITY OCCUPIED BY OWNER SHALL BE FREE FROM ELECTRICAL DEFECTS TO THE SATISFACTION OF THE AHJ. OWNER. ARCHITECT AND ENGINEER.
- 3. COORDINATE FINAL LOCATION AND INSTALLATION REQUIREMENTS OF ALL LIGHT FIXTURES, ELECTRICAL EQUIPMENT AND ELECTRICAL DEVICES WITH ARCHITECTURAL DRAWINGS, EXISTING CONDITIONS AND OTHER TRADES PRIOR TO ROUGH-IN. PROVIDE ALL NECESSARY DEVICES, CORDS, PLUGS, DISCONNECTS AND FINAL CONNECTIONS TO ELECTRICAL EQUIPMENT FOR PROPER OPERATION IN ACCORDANCE WITH CODE, OWNER AND MANUFACTURER REQUIREMENTS.
- 4. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC/SCHEMATIC IN NATURE AND REPRESENT THE GENERAL SCOPE OF WORK. IT IS NOT WITHIN THE SCOPE OF THE ELECTRICAL DRAWINGS TO SHOW ALL NECESSARY RACEWAY ROUTING, BENDS, OFFSETS, PULL BOXES AND OBSTRUCTIONS. CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF EQUIPMENT AND WIRING DEVICES WITH OTHER TRADES PRIOR TO INSTALLATION AND INSTALL ALL WORK TO CONFORM TO THE OWNER REQUIREMENTS.
- 5. ALL CONDUCTOR AND CONDUIT LENGTHS SHOWN IN THESE DESIGN DOCUMENTS ARE INTENDED SOLELY FOR USE IN THE DESIGN CALCULATIONS BY THE DESIGN PROFESSIONAL, UNLESS NOTED OTHERWISE, LENGTHS SHOWN SHALL NOT BE USED TO ASSIST IN THE BIDDING TAKEOFF PROCESS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE MATERIAL QUANTITIES REQUIRED TO BID AND CONSTRUCT THE COMPLETE PROJECT.
- 6. PROVIDE PROPER FIRE PROOFING AND SEALANT FOR PENETRATIONS THROUGH FIRE RATED ASSEMBLIES. THE FIRE STOPPING METHOD, MATERIAL AND ITS APPLICATION SHALL BE NRTL LISTED, CODE COMPLIANT AND APPROVED BY AHJ.
- 7 FOR CAST-IN-PLACE CONCRETE TILT-LIP WALLS PRECAST OR SIMILAR PRE-ENGINEERED WALL SYSTEMS: COORDINATE THE FINAL LOCATION OF ALL ELECTRICAL DEVICES, RACEWAYS, LIGHT FIXTURES AND PENETRATIONS WITH ARCHITECT, WALL SUPPLIER AND OTHER TRADES PRIOR TO WALL CONSTRUCTION. CONDUIT/RACEWAY IMBEDDED IN CONCRETE WALLS SHALL BE SCHEDULE 80 PVC OR LFMC; OTHER TYPES MAY BE ALLOWED IF APPROVED BY WALL SYSTEM MANUFACTURER AND ENGINEER.
- 8. WHEN CONCRETE TRENCHING/CORING IS REQUIRED, THE METHODS, DEPTHS, AND LOCATIONS SHALL BE PRE-APPROVED BY LANDLORD, ARCHITECT, AND STRUCTURAL ENGINEER PRIOR TO THE START OF WORK. X-RAY SLAB AS NECESSARY TO AVOID DAMAGING ANY UNDER-SLAB UTILITIES OR STRUCTURE. SLAB REPLACEMENT SHALL BE INSTALLED WITH DOWELLING AND REINFORCED CONCRETE AS DIRECTED BY THE STRUCTURAL ENGINEER. WHERE SLAB ON GRADE IS SAW-CUT AND REMOVED FOR TRENCHING THE CONTRACTOR SHALL INSTALL MOISTURE BARRIER PER LANDLORD'S REQUIREMENTS. PROVIDE 3/4" MINIMUM CONDUITS ROUTED THROUGH SLAB AND STUBBED UP INTO DEVICES. FOR SLAB ON DECK. THE FLOOR SHALL BE SLEEVED AND EQUIPPED WITH THE APPROPRIATE LISTED ASSEMBLY. PROVIDE 3/4" MINIMUM CONDUITS ROUTED BELOW SLAB, TIGHT TO STRUCTURE, AND STUBBED UP INTO DEVICES.
- 9. ALL APPLICABLE SWITCHES, RECEPTACLES, OUTLETS, AND CONTROLS SHALL BE PLACED AT HEIGHTS THAT ARE IN ACCORDANCE WITH ADA ACCESSIBILITY GUIDELINES.
- 10. COORDINATE FLOOR MOUNTED BOX, RECEPTACLE, AND COVER
- PLATE TYPES WITH ARCHITECT AND OWNER PRIOR TO ORDER. 11. WIRING DEVICES ADJACENT TO EACH OTHER SHALL BE INSTALLED
- 12. WIRING DEVICES SHOWN BACK-TO-BACK ON A COMMON WALL

UNDER A SINGLE COVER PLATE, UNO.

- SHALL BE OFFSET A MINIMUM OF 12" HORIZONTALLY TO REDUCE SOUND TRANSMISSION BETWEEN ROOMS, UNO.
- 13. ALL WP OUTLET BOX HOODS SHALL BE "EXTRA-DUTY" AND "WHILE-IN-USE COVER" TYPE. OUTLET BOX HOODS SHALL BE LOW PROFILE WHEREVER PRACTICABLE, UNLESS NOTED OTHERWISE. THE USE OF LARGE BUBBLE COVERS SHALL BE AVOIDED ON THE EXTERIOR OF THE BUILDING OR BEHIND EQUIPMENT IN ORDER TO PREVENT DAMAGE TO THE COVER AND TO ALLOW THE EQUIPMENT TO BE LOCATED CLOSE TO THE WALL.
- 14. ALL 120V RECEPTACLES 50A OR LESS, 208V AND 240V RECEPTACLES 100A OR LESS, SHALL BE GFCI PROTECTED IN LOCATIONS REQUIRED BY CODE: THIS INCLUDES BATHROOMS. KITCHENS/FOOD PREP AREAS, EXTERIOR LOCATIONS AND RECEPTACLES WITHIN 6 FEET OF A SINK. GFCI RECEPTACLES SHALL BE READILY ACCESSIBLE AND SHALL NOT BE LOCATED BEHIND STATIONARY EQUIPMENT. GFCI PROTECTION MAY BE VIA A GFCI CIRCUIT BREAKER OR GFCI RECEPTACLE, UNLESS NOTED OTHERWISE. WHERE NECESSARY, GFCI PROTECTION MAY BE ACHIEVED VIA A BLANK FACE GFCI DEVICE LOCATED IN A READILY ACCESSIBLE LOCATION NEAR RECEPTACLE BEING PROTECTED. FOR DOWNSTREAM WIRING DEVICES LOCATED ON THE SAME BRANCH CIRCUIT, THE GFCI PROTECTION MAY BE PROVIDED FOR BY A SINGLE UPSTREAM DEVICE IF ALL PROTECTED DEVICES ARE LABELED PER CODE.
- 15. FLEXIBLE CONDUIT IS ONLY PERMITTED WHERE SPECIFICALLY ALLOWED IN THE CONSTRUCTION DOCUMENTS. WHERE CONCEALED FROM VIEW OR EXPOSED FINAL CONNECTIONS TO LIGHT FIXTURES AND EQUIPMENT IN LENGTHS OF 6'-0" OR LESS.
- 16. ALL EMPTY CONDUIT/RACEWAY SHALL BE INSTALLED WITH PULL STRINGS. TERMINATE CONDUIT STUB-UP WITH A NYLON BUSHING. 17. EXPOSED CONDUIT/RACEWAY SHALL BE PAINTED TO MATCH ADJACENT SURFACE, UNLESS NOTED OTHERWISE. COORDINATE REQUIREMENTS WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.
- 18. CONDUITS/RACEWAYS SHALL BE CONCEALED FROM VIEW WHEREVER PRACTICABLE, UNLESS NOTED OTHERWISE. ROUTE CONDUITS SERVING ROOFTOP EQUIPMENT CONCEALED INSIDE EQUIPMENT CURB AND MINIMIZE ROOF PENETRATIONS AND EXTERIOR CONDUIT RUNS WHERE PRACTICABLE, SUPPORT RACEWAY FROM STRUCTURE, NOT ROOF DECK. MAINTAIN 2" MIN SPACING FROM BOTTOM OF ROOF DECK TO PREVENT ROOFING SCREWS FROM PENETRATING RACEWAY DO NOT ROUTE CONDUITS ACROSS SKYLIGHTS, ACCESS PANELS, HATCHED TILES HVAC DIFFUSERS, OR EQUIPMENT WORKING CLEARANCE SPACE. ROUTE ALL EXPOSED NON-FLEXIBLE CONDUITS TIGHT TO STRUCTURE, PARALLEL TO BUILDING LINES AND IN STRUT OR CABLE/PIPE TRAY WHERE PRACTICABLE. INSTALL CONDUITS PLUMB/ LEVEL WHERE EXPOSED TO VIEW. COORDINATE RACEWAY ROUTING AND INSTALLATION WITH OTHER TRADES PRIOR TO
- 19. WHERE PRACTICABLE, ALL UNDER-FLOOR/UNDER-GROUND CONDUITS/RACEWAY SHALL BE INSTALLED A MINIMUM OF 24" BELOW BOTTOM OF SLAB/PAVING/GRADE, UNLESS NOTED OTHERWISE. NOTE: THE DESIGN INTENT FOR INSTALLING ELECTRICAL CIRCUITRY AT THIS DEPTH IS TO PROTECT THE ELECTRICAL CIRCUITRY FROM DAMAGE DUE TO FUTURE WORK.
- 20. PROVIDE LABEL AT EACH RECEPTACLE COVER PLATE WITH THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. COORDINATE LABEL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.
- 21. MULTIWIRE BRANCH CIRCUITS ARE NOT ALLOWED, UNLESS NOTED OTHERWISE.
- 22. PROVIDE INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR ALL CIRCUITS, UNLESS NOTED OTHERWISE.



LOT 20 - HUB BUILDING

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No.	Date	Description
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REGISTRATION



ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT

ARCHITECTURE GBA

HOERR SCHAUDT /

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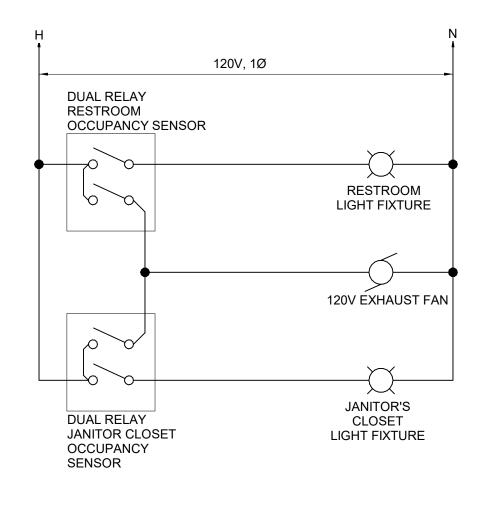
HENDERSON MECHANICAL **ENGINEERS**

ELECTRICAL HENDERSON **ENGINEERS** FIRE PROTECTION HENDERSON

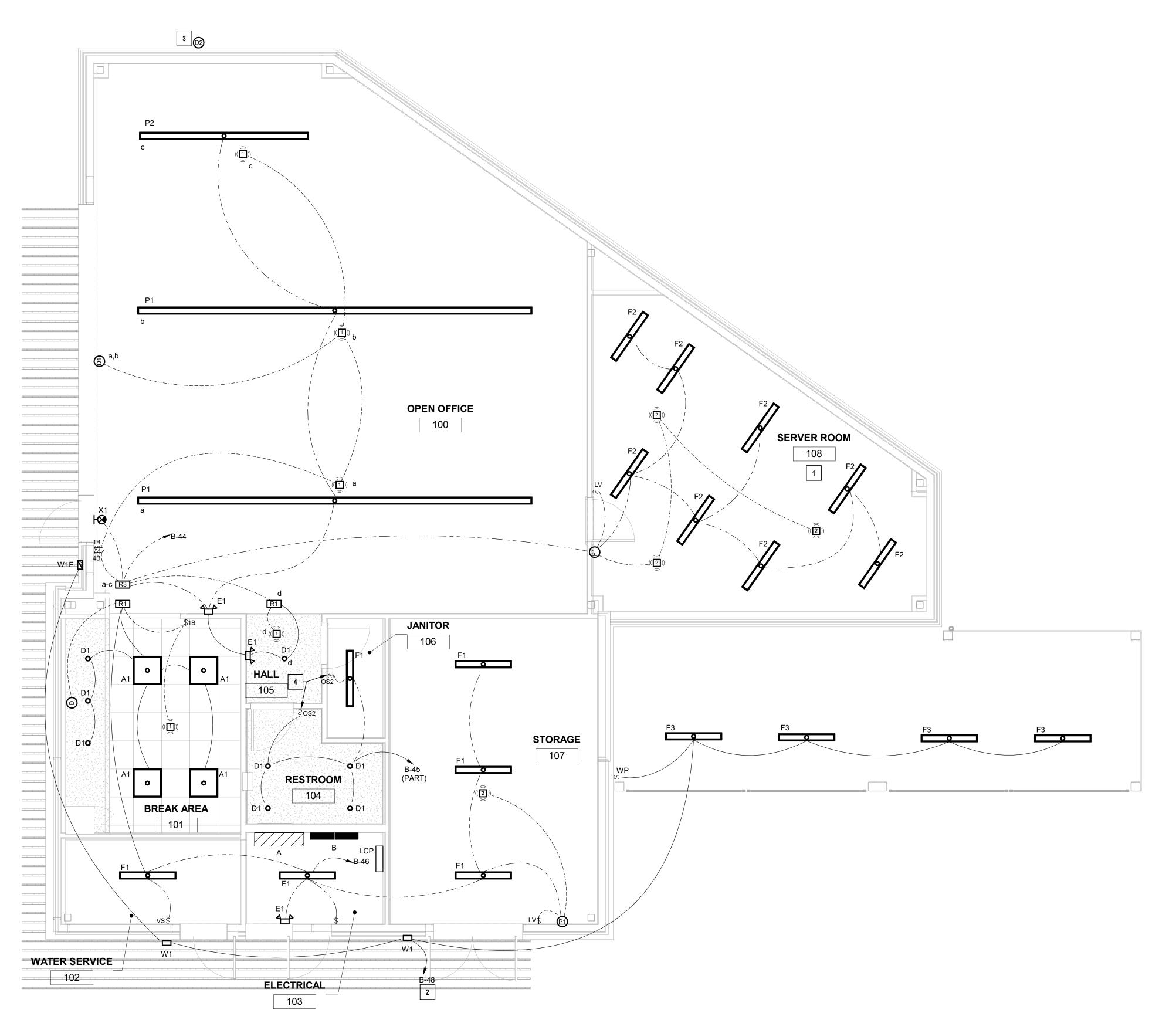
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SHEET TITLE **ELECTRICAL GENERAL NOTES AND LEGEND**



3 EXHAUST FAN/LIGHT CONTROL MULTIPLE ROOMS NTS



LIGHTING GENERAL NOTES:

- 1. THE EMERGENCY LIGHTING SYSTEM HAS BEEN DESIGNED TO PROVIDE AN INITIAL FLOOR ILLUMINANCE LEVEL OF 1 FC AVERAGE, 0.1 FC MINIMUM AND NO MORE THAN A 40:1 MAX/MIN RATIO ALONG THE EMERGENCY EGRESS PATHS. WHERE APPLICABLE, ADJUST AIMING OF EMERGENCY LIGHTS AS REQUIRED TO PROVIDE PROPER ILLUMINATION AT FLOOR AVOIDING OBSTACLES AND SHADOWS AFTER STORE SET-UP IS COMPLETE.
- 2. WALL MOUNTED EXITS SIGNS SHALL BE MOUNTED 12" ABOVE DOOR FRAME AND CENTERED ABOVE DOOR OPENING, UNLESS NOTED OTHERWISE. EXIT SIGNS SHALL BE READILY VISIBLE FROM DIRECTION OF EGRESS TRAVEL. COORDINATE FINAL EXIT SIGN LOCATIONS WITH AHJ AND OWNER.
- 3. SUSPEND BACK OF HOUSE AND STORAGE AREA LIGHT FIXTURES AS HIGH AS PRACTICABLE IN ORDER TO AVOID DAMAGE, UNLESS NOTED OTHERWISE. SUSPEND JUST BELOW DUCTWORK AND SIMILAR OBSTRUCTIONS WHERE NECESSARY TO AVOID SHADOWS. COORDINATE REQUIREMENTS WITH OWNER AND OTHER DISCIPLINES PRIOR TO INSTALLATION.
- 4. PROVIDE LABEL AT EACH MANUAL LIGHT SWITCH INDICATING THE LIGHT FIXTURE(S) THAT THE SWITCH CONTROLS AND THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. A SINGLE LIGHT SWITCH FOR A SMALL ROOM DOES NOT NEED TO INDICATE THE SPACE CONTROLLED SINCE IT IS INTUITIVELY OBVIOUS. COORDINATE LABEL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.
- 5. ALL REMOTELY LOCATED LIGHT FIXTURE POWER SUPPLIES SHALL BE LOCATED IN AN ACCESSIBLE LOCATION WITH PROPER VENTILATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CONCEAL DEVICES AND RELATED WIRING FROM CUSTOMER/PUBLIC VIEW. PROVIDE ENCOSURE IF REQUIRED. COORDINATE LOCATION AND ENCLOSURE TYPE WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.

LIGHTING SUPPLEMENTAL SPECIFICATIONS:

- 1. REFER TO THE ARCHITECTURAL DRAWINGS FOR LIGHT FIXTURE LOCATIONS, MOUNTING HEIGHTS, TRACK LENGTHS AND ADDITIONAL MOUNTING INFORMATION. CONTRACTOR SHALL BE RESPONSIBLE FOR INSURING THAT COORDINATION AND CONFLICT ISSUES ARE RESOLVED PRIOR TO INSTALLATION OF LIGHT FIXTURES. CONTACT ARCHITECT/ENGINEER IMMEDIATELY IF THERE ARE DISCREPANCIES.
- 2. THROUGH WIRING OF RECESSED LIGHT FIXTURES, IN SUSPENDED CEILINGS, IS NOT PERMITTED. CONNECT EACH LIGHT FIXTURE BY A WHIP TO A JUNCTION BOX. PROVIDE CABLE WHIPS OF SUFFICIENT LENGTHS TO ALLOW FOR RELOCATING EACH LIGHT FIXTURE WITHIN A 5'-0" RADIUS OF ITS INDICATED LOCATION. CABLE WHIPS SHALL NOT EXCEED 6'-0" OF UNSUPPORTED LENGTHS.
- 3. ALL EMERGENCY LIGHTS AND EXIT SIGNS WITH INTEGRAL BATTERY BACK-UP SHALL BE CONNECTED TO A SEPARATE UNSWITCHED CONDUCTOR BYPASSING ALL OTHER CONTROLS AND CONTACTORS, UNLESS NOTED OTHERWISE. EXIT SIGNS SHALL NOT BE SWITCHED. REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR PROPER INSTALLATION AND TESTING. ALLOW BATTERY TO CHARGE FOR A MINIMUM OF 48 HOURS BEFORE LIGHT LEVEL TESTING. IN ORDER TO PREVENT BATTERY DAMAGE, DO NOT TURN OFF POWER FOR EXTENDED PERIODS OF TIME AFTER EMERGENCY LIGHT HAS BEEN POWERED.
- 4. PROVIDE A NEUTRAL CONDUCTOR TO ALL WALL MOUNTED LINE VOLTAGE LIGHT SWITCHES, UNLESS NOTED OTHERWISE. IF NEUTRAL TERMINATION IS NOT REQUIRED FOR THE DEVICE THEN CAP CONDUCTOR AND TAG AS "NEUTRAL FOR FUTURE USE".
- 5. COORDINATE ALL OCCUPANCY/VACANCY SENSOR SETTINGS WITH OWNER AND ADJUST AS NECESSARY FOR PROPER OPERATION. SETTINGS MUST COMPLY WITH AHJ AND LOCAL ENERGY CODE REQUIREMENTS.
- 6. DO NOT INSTALL OCCUPANCY/VACANCY SENSORS WITHIN 48" OF AIR DIFFUSER OR SIMILAR OBSTRUCTION THAT MAY ADVERSLY AFFECT THE SENSOR PERFORMANCE. COORDINATE FINAL SENSOR LOCATIONS WITH OTHER TRADES AND INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

ELECTRICAL PLAN NOTES:

- COORDINATE LIGHT FIXTURE AND OCCUPANCY SENSOR LAYOUT WITH DATA RACKS AND LADDER RACKS. ADJUST LOCATIONS AS NECESSARY TO AVOID OBSTRUCTIONS.
 ROUTE CIRCUIT VIA RELAY PANEL. REFER TO SHEET E5.01 FOR ADDITIONAL INFORMATION.
- 3 PROVIDE EXTERIOR DAYLIGHT SENSOR ON NORTH FACING WALL. SHIELD SENSOR FROM ARTIFICIAL LIGHTING. SENSOR SHALL BE FROM SAME MANUFACTURER AS LIGHTING CONTROL PANEL, PROVIDE LOW-VOLTAGE WIRING TO PANEL PER MANUFACTURER'S REQUIREMENTS.
- 4 REFER TO DETAIL 2, E1.01 FOR SWITCH CONTROL FOR EXHAUST FAN.



LOT 20 - HUB BUILDING

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REVISIONS

No. Date Description

REGISTRATION



ANDREA C. MULVANY LICENSE # PE-2013039892

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LANDSCAPE HOERR SCHAUDT / LAND3

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EXPIRES 12/31/2021

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SHEET TITLE

LIGHTING PLAN

SHEET NUMBER

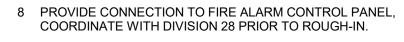
E1.01

ELECTRICAL PLAN NOTES:

- 1 PROVIDE WIREMOLD RFB6E-OG FLOOR BOX (OR APPROVED EQUIVALENT) WITH (2) DUPLEX RECEPTACLES AND (2) COMMUNICATIONS BRACKETS TO MATCH OWNER'S DATA EQUIPMENT. INCLUDE FPBTC FLUSH COVER, SET BOX HEIGHT WITH FLOOR. COVER ASSEMBLY FINISH COLOR TO BE CONFIRMED WITH ARCHITECT. PROVIDE 2" CONDUIT (WITH PULL STRING) FOR DATA AND 1" CONDUIT FOR POWER ÙNDERSLAB TO NEÁREST FULL HEIGHT PARTITION WALL, TURN 90 DEGREES, AND ROUTE TO ABOVE CEILING.
- 2 PROVIDE JUNCTION BOX AND TOGGLE DISCONNECT SWITCH AND INSTALL LOW-VOLTAGE TRANSFORMER, SUPPLIED BY PLUMBING CONTRACTOR WITH EQUIPMENT, FOR ELECTRONIC ACTUATED FLUSH VALVES AND FAUCETS. COORDINATE EXACT LOCATION AND QUANTITY OF JUNCTION BOX(ES) WITH PLUMBING CONTRACTOR PRIOR TO ROUGH-IN.
- 3 PROVIDE WALL MOUNTED JUNCTION BOXES FOR SOLENOID AND SENSORS ASSOCIATED WITH AUTOMATIC OPERATION OF PLUMBING FIXTURES. PROVIDE (2) WALL MOUNTED JUNCTION BOXES FOR EACH WATER CLOSET (WC) AND URINAL AND PROVIDE (1) WALL MOUNTED JUNCTION BOX FOR EACH FAUCET. VERIFY EXACT LOCATIONS AND FULLY COORDINATE INSTALLATION WITH PLUMBING CONTRACTOR PER PLUMBING FIXTURE EQUIPMENT INSTALLATION
- GUIDELINES PRIOR TO ROUGH-IN. 4 PROVIDE 3/4" CONDUIT WITH 24V, #14 AWG WIRE FOR
- AUTOMATIC OPERATION OF PLUMBING FIXTURES. 5 PROVIDE CONNECTION TO SECURITY PANEL(S), COORDINATE WITH DIVISION 28 PRIOR TO ROUGH-IN. 6 GROUND BAR, REFER TO TN SHEETS FOR ADDITIONAL INFORMATION. REFER TO ONE-LINE DIAGRAM FOR GROUNDING REQUIREMENTS.

7 PROVIDE FURNITURE FEED WHIP PER FURNITURE

MANUFACTURER'S REQUIREMENTS. MOUNT IN WALL AT +18"



PARAGON STAR

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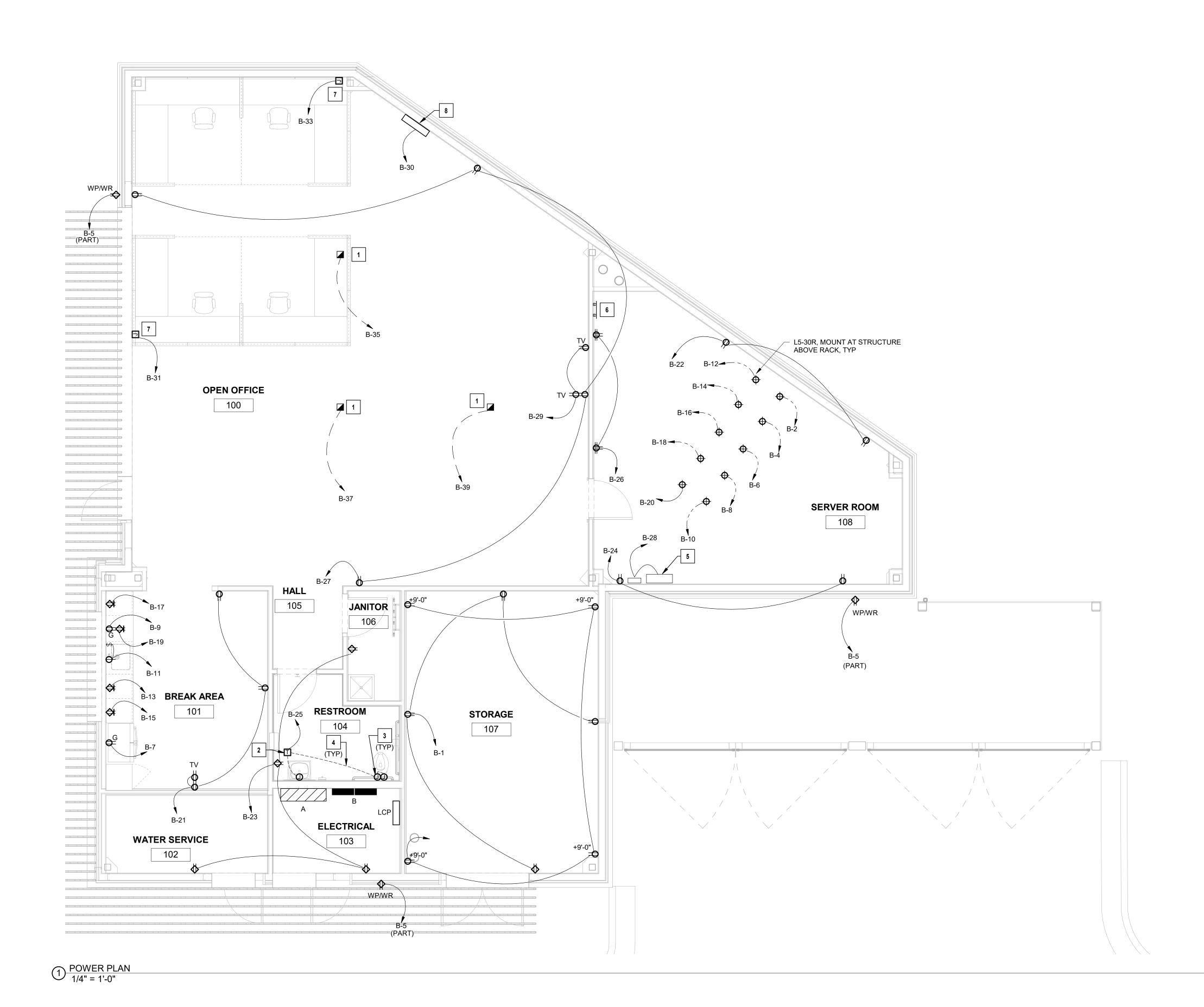
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> > EXPIRES 12/31/2021

SHEET TITLE

POWER PLAN





- 1 PROVIDE CONNECTION TO RECEPTACLE FURNISHED WITH ROOF-TOP UNIT (RTU) PER MANUFACTURER'S REQUIREMENTS.
- MECHANICAL EQUIPMENT FURNISHED WITH INTEGRAL
 DISCONNECT. PROVIDE CONNECTION PER
 MANUFACTURERS REQUIREMENTS
- MANUFACTURERS REQUIREMENTS.

 3 ROUTE CIRCUIT VIA RELAY PANEL. REFER TO SHEET E5.01 FOR ADDITIONAL INFORMATION.
- 5 REFER TO DETAIL 2, E1.01 FOR SWITCH CONTROL FOR EXHAUST FAN.



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PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS

ARCHITECTURE

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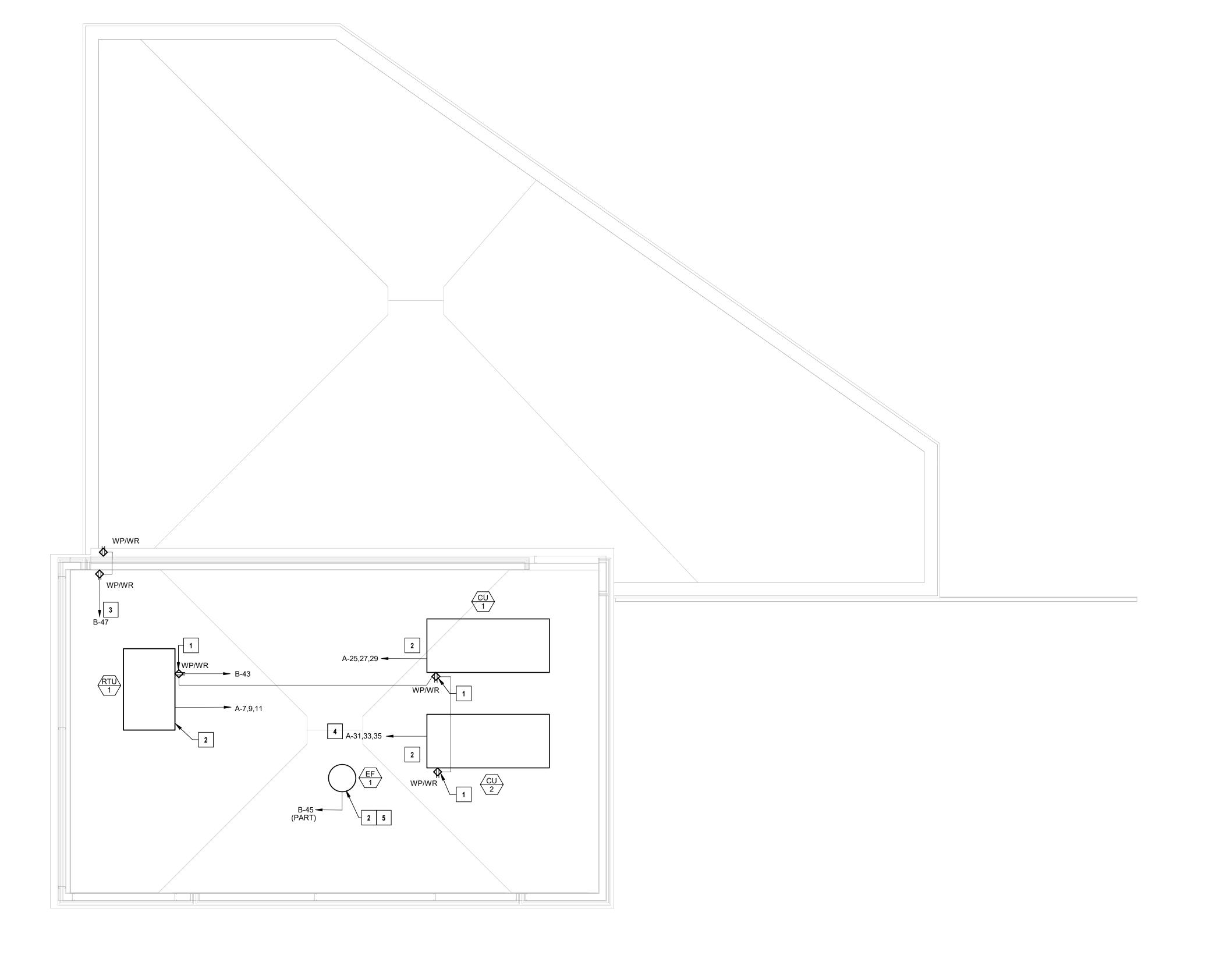
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SHEET TITLE

POWER ROOF PLAN

SHEET NUMBER

E2.02





PARAGON STAR

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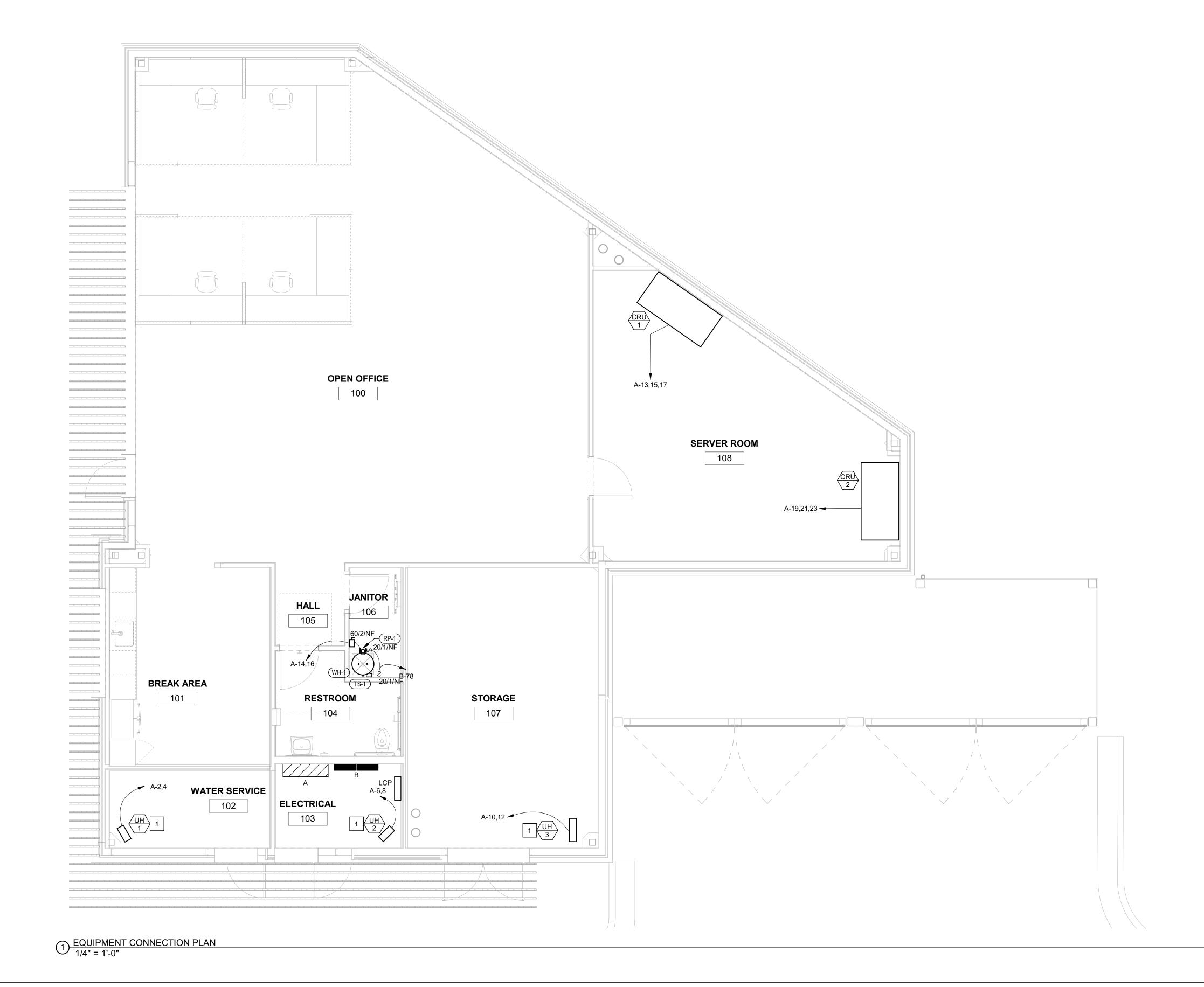
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SHEET TITLE

EQUIPMENT CONNECTION PLAN

> SHEET NUMBER E3.01



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																0 VA			0 VA	AY (D)	
														-		0 VA			0 VA	.) IOTOR	CHE
														-		3738 \ 0 VA			2990 VA 0 VA	DOW (W)	
														-		0 VA			0 VA	HTING	

BUS / MAIN VOLT	NELBOARD: B (NEV AMPS: 225A SIZE/TYPE: MLO S/PHASE: 208Y/120 V 3P/4W PLIED BY: A	V)				FAULT (AIC RAT AIC RAT SERVES MOUNT LOCATI	TING: S: TING:	10,000 AII FULLY RA FCA +109 GENERAI SURFACE ELECTRI	ATED 6 MINIMUN _ PURPOS E							EQUIPMENT GI LINE-SIDE LUGS: M	
CKT NO.	DESCRIPTION	LOAI TYPI		WIRE BKR P SIZE AMP	Pl	HASE A		ASE B	PH/				NIRE SIZE	NOTES	LOAD TYPE	DESCRIPTION	CKT NO.
1	STORAGE ROOM	R		12 20 1	720	2000						30	10		Z	DATA RACK 1A	2
3	STORAGE ROOM FANS	R		12 20 1			720	2000				30	10		Z	DATA RACK 1B	4
5	EXTERIOR	R	05	12 20 1	750	0000	_		540	2000		30	10		Z	DATA RACK 1C	6
7	REFRIGERATOR DISHWASHER	Z	GF GF	12 20 1 12 20 1	750	2000	750	180				30 30	10		Z R	DATA RACK 1D DATA RACK 1E SPARE	8 10
11	DISPOSAL	ZM		12 20 1			730	100	1176	180		30	10		R	DATA RACK 1E SPARE DATA RACK 2A SPARE	12
13	COUNTER APPLIANCE A	R	- 01	12 20 1	180	180		L	1170	100		30	10			DATA RACK 2B SPARE	14
15	MICROWAVE	Z		12 20 1		100	1750	180				30	10		R	DATA RACK 2C SPARE	16
17	COFFEE MAKER	Z		12 20 1					1500	180		30	10		R	DATA RACK 2D SPARE	18
19	COUNTER APPLIANCE B	R		12 20 1	180	180						30	10		R	DATA RACK 2E SPARE	20
21	BREAK AREA	R		12 20 1			720	360				20	12		R	SERVER ROOM - GENERAL A	22
23	ELEC/WATER/JAN/RR	R		12 20 1		000	_		720	360		20	12		R	SERVER ROOM - GENERAL B	24
25	FLUSH VALVES	Z		12 20 1	50	360	700	200				20	12		R	SERVER ROOM - GENERAL C SECURITY PANELS	26
27	OPEN OFFICE - GENERAL OPEN OFFICE TV'S	R R		12 20 1 12 20 1			720	200	360	260	_ · _ •	20	12 12		7	FIRE ALARM PANEL	28
29 31	FURNITURE FEED A	Z		12 20 1 12 20 1	500	0		l	300	360		20 20	12		Z	SPARE	30 32
33	FURNITURE FEED B	Z		12 20 1	300	0	500	0				20				SPARE	34
35	OPEN OFFICE FLOOR BOX A	R		12 20 1					360	0		20				SPARE	36
37	OPEN OFFICE FLOOR BOX B	R		12 20 1	360	0	7	L				20				SPARE	38
39	SECRUITY DESK FLOOR	R		12 20 1			360	0			1 2	20				SPARE	40
41	SPARE			20 1					0	0	1 2	20				SPARE	42
43	ROOFTOP MAINTENANCE	R		12 20 1	540	920						20	12	EM	LZ	OPEN OFFICE/SERVER	44
45	EF-1 / LIGHTS	L _M		12 20 1			258	225				20	12	EM	LZ	BACK OF HOUSE/BREAK	46
47	HOLIDAY LIGHTS	R	RP	12 20 1			_		360	366		20	12	EM,RP	L	EXTERIOR	48
49 51	SPARE SPARE			20 1	0	0	0	0				20				SPARE SPARE	50 52
53	SPARE			20 1			U	0	0	0		20				SPARE	54
55	SPARE			20 1	0	0		L	0	0		20				SPARE	56
57	SPARE			20 1			0	0				20				SPARE	58
59	SPARE			20 1					0	0		20				SPARE	60
61	SPARE			20 1	0	0		L			1 2					SPARE	62
63	SPARE			20 1			0	0				20				SPARE	64
65	SPARE			20 1			_		0	0		20				SPARE	66
67	SPARE			20 1	0	0					1 2					SPARE	68
69	SPARE			20 1			0	0		_	1 2					SPARE	70
71 73	SPARE SPARE			20 1	0	0	7		0	0		20 20				SPARE SPARE	72 74
75	SPARE			20 1	- 0	U	0	0				20				SPARE	76
77	SPARE			20 1					0	120		20	12		М	RECIRC PUMP/TIME SWITCH	78
79	SPARE			20 1	0	0		L				-+			1		80
81	SPARE			20 1		'	0	0			_ 3 4	40				SPD	82
83	SPARE			20 1					0	0							84
			TOTAL	LOAD (VA):	89	20 VA	892	23 VA	8582	2 VA							
			TOTAL	,		75 A		5 A	72								
			TOTAL	AIVIPS.		75 A	1;	5 A	12	. A							
LOAD) TYPE C		DEMAND FACTOR	NEC DEMAND	PANE	LBOARD N	IOTES									PANELBOARD TOTALS	
EXIS	TING LOAD (E)	0 VA	100%	0 VA	 .		<u> </u>	ON 0: :::			- \	<u> </u>		DE * : :			000==::
	LING (C)	0 VA	0%	0 VA	⊢ EM - E	MERG LT	HANDLE ف	ON CLAMF	' G	F - GFCI	IYPE	CIRC	JUIT B	REAKER		TOTAL CONNECTED LOAD	26225 VA
HEAT	TING (H)	0 VA	100%	0 VA]											TOTAL NEC LOAD	26911 VA
	TING (L)	1569 VA	125%	1961 VA	_											TOTAL CONNECTED CURRENT	73 A
	EPTACLES (R)	9000 VA	100%	9000 VA	4												
	ORS (M)	320 VA	100%	320 VA	4											TOTAL NEC DEMAND CURRENT	75 A
	PLEMENTAL HEAT (U)	0 VA 14160 VA	100% 100%	0 VA 14160 VA	-												
	EQUIP (Z) RIGERATION (F)	0 VA	100%	0 VA	+												
	/DISPLAY (D)	0 VA	125%	0 VA	\dashv												
	HEN (K)	0 VA	100%	0 VA	\dashv												
	GEST MOTOR	1176 VA	125%	1470 VA	\dashv												
	W WINDOW (W)	0 VA	125%	0 VA	7												
	CK LIGHTING	0 VA	100%	0 VA	\dashv												

BUILDING OCCUPANCY TYPE: OFFICE BUILDING SERVICE DESCRIPTION:										
BUILDING SQUARE FOOTAGE: 2	208	//120 V								
LOAD TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC DEMAND							
EXISTING LOAD (E)	0 VA	100%	0 VA							
COOLING (C)	56344 VA	100%	56344 VA							
HEATING (H)	17400 VA	0%	0 VA							
LIGHTING (L) (PER NEC-220)	7803 VA	125%	9754 VA							
RECEPTACLES (R)	9000 VA	100%	9000 VA							
MOTORS (M)	4810 VA	100%	4810 VA							
SUPPLEMENTAL HEAT (U)	17000 VA	100%	17000 VA							
MISC EQUIP (Z)	14160 VA	100%	14160 VA							
REFRIGERATION (F)	0 VA	100%	0 VA							
SIGN/DISPLAY (D)	0 VA	125%	0 VA							
KITCHEN (K)	0 VA	100%	0 VA							
LARGEST MOTOR	2990 VA	125%	3738 VA							
SHOW WINDOW (W)	0 VA	125%	0 VA							
TRACK LIGHTING	0 VA	100%	0 VA							
TOTAL LOAD	129507	VA	114805							
TOTAL AMPACITY	359	AMPS	319							
SERVICE AMPACITY		AMPS	400							
SPARE CAPACITY		AMPS	81							

FEEDER TAG	FEEDER DESCRIPTION
23	(3)#12, (1)#12 G, 1/2" C
63	(3)#6, (1)#10 G, 3/4" C
113	(3)#2, (1)#6 G, 1-1/4" C
154	(4)#1/0, (1)#6 G, 1-1/2" C
G4	#4 COPPER GROUND, 3/4" C
G6	#6 COPPER GROUND, 3/4" C
G10	#1/0 COPPER GROUND, 3/4" C
MBJ	MAIN BONDING JUMPER, #1/0
S404	(2) 2" C, EACH W/ (4)#3/0
TG10	#1/0 cu

FEEDER TAG	FEEDER DESCRIPTION
23	(3)#12, (1)#12 G, 1/2" C
63	(3)#6, (1)#10 G, 3/4" C
113	(3)#2, (1)#6 G, 1-1/4" C
154	(4)#1/0, (1)#6 G, 1-1/2" C
G4	#4 COPPER GROUND, 3/4" C
G6	#6 COPPER GROUND, 3/4" C
G10	#1/0 COPPER GROUND, 3/4" C
MBJ	MAIN BONDING JUMPER, #1/0
S404	(2) 2" C, EACH W/ (4)#3/0
TC10	#1/0 cu

JUTILITY TRANSFORMER 208Y/120V 3Ø 4W 400A NEUTRAL BUS ______ , TO GROUND BAR IN SERVER ROOM 🛩 TO METAL IN-GROUND SUPPORT STRUCTURES •—— TO METAL UNDERGROUND WATER PIPING 5 TO BUILDING FOOTING (UFER) -TO GROUND ROD(S)—

1 ELECTRICAL ONELINE NTS

Short-Circuit and Voltage Drop Calculations Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance The following calculations are based on the "Point-by-Point" method where: VOLTAGE DROP (3Ø): Feeder: $f(3\emptyset) = \underline{1.732 \times L \times lsc}$ XFMR: $f(3\emptyset) = IP(sca)x Vp x 1.73 x \%Z$ %VD= ((R x cos(arccos(pf)) + X x sin (arccos(pf))) x L/# x I x 1.73) / E $ISC(2) = ISC(1) \times M(1)$ IS(sca)= Vp x M x IP(sca) ISC (1) = short circuit current at fault point 1 СхЕ 100,000 x KVA VOLTAGE DROP (1Ø): Feeder: $f(1\emptyset) = 2 \times L \times Isc$ ISC (2) = short circuit current at fault point 2 XFMR: $f(1\emptyset) = IP(sca)x Vp x \%Z$ %VD= ((R x cos(arccos(pf)) + X x sin(arccos(pf))) x 2 x L/# x I) / E 100,000 x KVA IP = Primary short circuit current Vp = Primary voltage %VD CUM= Cumulative Voltage Drop from Fault Point 1 to Fault Point # IS= Secondary short circuit current Vs= Secondary voltage R= resistance in ohms per LF X= reactances in ohms per LF L = Length of circuit E = Line to line volts C = "C" Factor from Bussman table where "C" = 1 / impedance per linear foot Feeder Types: NM - Non Magnetic Conduit, M -. Date of... System Voltage: 208Y/120V - 3 phase f M Fault Voltage Voltage Drop (%VD) (%VD) (F#) Source (Fault Point) Source (Fault Point) Phase Source Isc (amps) Conduit Type/ TX Material Material Phase & Neutral Size Feeder Conductor 'C' Value Circuit Load Power Factor (pf) (E) Circuit Load Power Factor (pf) Circuit Load (Amperage) Resistance (R) Reactance (X) (Radians) Type Point (F#) Degree Rise kVA New Xfmr Z Existing Secondary Voltage Tap Setting Bus/Feeder Description 1 Utility Service Point Source Isc + 6X Motor Contribution = 160 The connected full load motor amps (includes compressors) on the system Motor Contribution 13923 1 3 5,124 NM CU 2 Set(s) of 3/0 AWG 208 70 0.9 320 0.000077 0.000042 0.451027 0.107 0.90 4,628 -0.82% -0.82% 2 3 4,628 M CU 1 Set(s) of 1/0 208 5 0.9 120 0.000120 0.000055 0.451027 4 RTU-1 2 3 4,628 M CU 1 Set(s) of 6 208 40 0.000490 0.000064 208 70 0.85 208 65 0.85 208 45 0.8 208 40 0.8 2 3 4,628 M CU 2 3 4,628 M CU 5 CRU-1 0.000200 0.000057 0.554811 0.457 0.69 3,177 -0.91% -1.73% 1 Set(s) of 2 6 CRU-2 7 CU-1 1 Set(s) of 2 0.000200 0.000057 0.554811 0.424 0.70 3,250 -0.84% -1.66% 2 3 4,628 M CU 1 Set(s) of 12 2 3 4,628 M CU 1 Set(s) of 12 0.002000 0.000068 0.643501 2.811 0.26 1,214 -0.31% -1.12%

0.002000 0.000068 0.643501

ELECTRICAL PLAN NOTES:

- 1 PROVIDE CONNECTION TO GROUND BAR IN SERVER ROOM, REFER TO TN SHEETS FOR ADDITIONAL INFORMATION. 2 PROVIDE SURGE PROTECTIVE DEVICE (SPD) INTEGRAL TO SWITCHBOARD/PANELBOARD. COORDINATE OVERCURRENT PROTECTION DEVICE SIZE WITH SPD SUBMITTAL INFORMATION AND PROVIDE AS REQUIRED. REFER TO
- SPECIFICATIONS FOR ADDITIONAL INFORMATION. 3 PROVIDE UNUSED SPACES IN MAIN SWITCHBOARD WITH FULL BUSSING FOR FUTURE INSTALLATION OF DEVICES.

2.498 0.29 1,323 -0.27% -1.09%

ONE-LINE DIAGRAM GENERAL NOTES:

- 1. THE INFORMATION SHOWN IN THE SHORT-CIRCUIT AND VOLTAGE DROP CALCULATIONS SCHEDULE IS SHOWN FOR CALCULATION PURPOSES ONLY. CONTRACTOR SHALL NOT USE THE CONDUIT TYPES, CONDUCTOR TYPES, SIZES, QUANTITIES OR LENGTHS FOR TAKEOFFS OR BIDDING PURPOSES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN THIS SCHEDULE AND OTHER PORTIONS OF THE CONSTRUCTION DOCUMENTS. CONTRACTOR SHALL NOTIFY ENGINEER OF AS-BUILT CONDITIONS THAT CONSTITUTE A CHANGE FROM WHAT IS SHOWN BELOW; THIS INCLUDES CONDUCTOR LENGTHS DIFFERING BY MORE THAN 10%.
- 2. REFER TO THE SHORT-CIRCUIT AND VOLTAGE DROP CALCULATIONS TABLE ON THIS SHEET. AVAILABLE FAULT CURRENT INFORMATION IS LISTED UNDER THE "FAULT CURRENT" COLUMN. VOLTAGE DROP VALUES ARE LISTED UNDER THE "CUMULATIVE VOLTAGE DROP" COLUMN. THE AIC/SCCR RATING OF THE EQUIPMENT SHALL NOT BE LESS THAN THE AVAILABLE 3-PHASE SYMMETRICAL FAULT CURRENT. ALL SERIES RATED
- EQUIPMENT SHALL BE PROPERLY LISTED AND LABELED PER CODE. 3. FEEDER NUMBER DESIGNATIONS PRECEDED BY "V" INDICATE THAT THE CONDUCTORS ARE UP-SIZED DUE TO VOLT-DROP CONSIDERATIONS. PROVIDE LUG ADAPTERS AS NEEDED IN ORDER TO PROPERLY LAND CONDUCTORS AT TERMINATION(S).
- 4. FEEDER SIZES ARE BASED ON COPPER (CU) THHN/THWN-2 INSULATION, UNLESS NOTED OTHERWISE. CONDUIT SIZES SHOWN ARE APPROPRIATE FOR SCHEDULE 40 PVC, EMT, GRS, IMC AND RMC; ADJUST SIZE AS NEEDED FOR OTHER RACEWAY TYPES. NUMBER DESIGNATIONS PRECEDED BY "A" INDICATE THAT THE SIZE IS BASED ON ALUMINUM (AL) WIRE. AL CONDUCTOR SIZES ARE BASED ON XHHW-2 INSULATION, UNLESS NOTED OTHERWISE. AL WIRE MAY BE SUBSTITUTED FOR CU FEEDERS AS ALLOWED BY CODE, SPECIFICATIONS AND OWNER, UNLESS NOTED OTHERWISE. AT CONTRACTOR'S OPTION, CU WIRE MAY BE SUBSTITUTED FOR AL, UNLESS NOTED OTHERWISE. ALL CONDUCTOR SIZES ARE BASED ON 75 DEG C RATED TERMINATIONS, UNLESS NOTED OTHERWISE. FOR ANY OTHER CONDITIONS MODIFY SIZES PER CODE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- 5. BRANCH CIRCUIT SIZES ARE BASED ON COPPER (CU) THHN/THWN-2 INSULATION, UNLESS NOTED OTHERWISE. CONDUIT SIZES SHOWN ARE APPROPRIATE FOR SCHEDULE 40 PVC, EMT, GRS, IMC AND RMC; ADJUST SIZE AS NEEDED FOR OTHER RACEWAY TYPES. ALL CONDUCTOR SIZES ARE BASED ON 60 DEG C RATED TERMINATIONS, UNLESS NOTED OTHERWISE. FOR ANY OTHER CONDITIONS MODIFY SIZES PER CODE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- 6. PROVIDE A PERMANENT LABEL ON FRONT OF EQUIPMENT ENCLOSURE; REFER TO SPECIFICATIONS FOR LABEL REQUIREMENTS. LABEL SHALL READ AS FOLLOWS (INCLUDE RESPECTIVE NAMES IN BLANKS): SERVICE EQUIPMENT LABEL:

EXAMPLE: 208Y/120V, 60HZ SCCR = 65,000A

MAX AVAILABLE FAULT CURRENT = 58,815A CALCULATED: 01/01/2018 PANELBOARD/SWITCHBOARD LABEL:

LINE 1: PANELBOARD "_____" SUPPLIED BY UPSTREAM LINE 2: PANELBOARD/SWITCHBOARD "_____" LINE 5: PANELBOARD(S) "____" SUPPLIES DOWNSTREAM

TRANSFORMERS LABEL: LINE 1: TRANSFORMER " "SUPPLIED BY UPSTREAM LINE 2: PANELBOARD/SWITCHBOARD "_____" LINE 3: LOCATED IN "

"SUPPLIES DOWNSTREAM LINE 4: TRANSFORMER " LINE 5: PANELBOARD(S) "_ **ELECTRICAL UTILITY CONTACT NOTE:**

UTILITY COMPANY: EVERGY UTILITY CONTACT: JENNY CASEY OR JEFF WILLIAMS PHONE: (816) 347-4334 OR (816) 220-5204 EMAIL: JENNY.CASEY@EVERGY.COM OR

JEFF.WILLIAMS@EVERGY.COM

FAULT CURRENT GENERAL NOTE (ESTIMATED VALUE):

THE MAXIMUM AVAILABLE 3-PHASE SYMMETRICAL FAULT CURRENT VALUE AT THE UTILITY TRANSFORMER SECONDARY/POINT OF SERVICE COULD NOT BE DETERMINED AT THE TIME OF THIS SUBMITTAL. THE ESTIMATED WORST CASE VALUE OF 4,164A IS BASED ON AN INFINITE BUS CALCULATION AT THE UTILITY TRANSFORMER. CONTRACTOR SHALL VERIFY ACTUAL AVAILABLE FAULT CURRENT VALUE WITH UTILITY. NOTIFY ENGINEER IF ACTUAL VALUE EXCEEDS ESTIMATED CALCULATED VALUE. ESTIMATED DESIGN VALUE IS BASED ON THE FOLLOWING:

UTILITY TRANSFORMER SECONDARY VOLTAGE: 208Y/120V, 3Ø, 4W UTILITY TRANSFORMER SIZE: 75KVA, Z=5.0%

OVERCURRENT PROTECTIVE DEVICE

COORDINATION STUDY GENERAL NOTE

1. CONTRACTOR SHALL PROVIDE AN OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY TO DETERMINE THE CORRECT SETTINGS FOR THE ADJUSTABLE TRIP CIRCUIT BREAKERS, TO ENSURE SELECTIVE COORDINATION AND TO DOCUMENT ARC-FLASH HAZARDS. CODE REQUIRED EMERGENCY AND LEGALLY REQUIRED STANDBY SYSTEMS SHALL BE SELECTIVELY COORDINATED WITH ALL SUPPLY-SIDE OVERCURRENT PROTECTIVE DEVICES (APPLIES TO BOTH THE NORMAL AND EMERGENCY POWER SOURCES). PROVIDE ALL NECESSARY AS-BUILT INFORMATION REQUIRED FOR COMPLETION OF THE STUDY TO THE ENGINEER DOING THE STUDY. PROVIDE SUBMITTALS INDICATED WITHIN THE SPECIFICATIONS TO OWNER AND ARCHITECT/ENGINEER TO CONFIRM STUDY HAS BEEN COMPLETED. CONTRACTOR SHALL INCLUDE THE COST FOR THIS WORK IN THEIR BID. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

ONE-LINE DIAGRAM SUPPLEMENTAL SPECIFICATIONS:

- 1. GROUNDING ELECTRODE SYSTEM SHALL BE PER LOCAL REQUIREMENTS AND SHALL NOT BE LESS STRINGENT THAN THAT SPECIFIED IN THE CONSTRUCTION DOCUMENTS.
- 2. PROVIDE PROPERLY SIZED LUGS FOR ALL EQUIPMENT, CIRCUIT BREAKERS, AND OTHER ELECTRICAL DEVICES TO ACCOMMODATE INSTALLED CONDUCTORS. A LARGER FRAME, OVERSIZED LUGS OR NON-STANDARD PRODUCT MAY BE REQUIRED IN SOME INSTANCES. UTILIZE PIN ADAPTERS ONLY IF NECESSARY AND ONLY AS ALLOWED BY MANUFACTURER AND AHJ.
- 3. PROVIDE ANY AVAILABLE SPACE IN SWITCHBOARDS/PANELBOARDS WITH BUSSING.
- PROVIDE TYPED FINAL CIRCUIT DIRECTORY FOR ALL PANELBOARDS TO REFLECT ACTUAL AS-BUILT CONDITIONS. COORDINATE FINAL ROOM NAMES, NUMBERS AND DESCRIPTIONS WITH OWNER PRIOR TO COMPLETION. CIRCUIT DESCRIPTIONS SHALL BE PER CODE AND SHALL BE DISTINGUISHABLE FROM ALL OTHERS.



LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY

Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET

REVISIONS

_____ ____ ____

REGISTRATION



ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

GBA

CIVIL

LANDSCAPE HOERR SCHAUDT / LAND3 FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

STRUCTURAL BSE STRUCTURAL **ENGINEERS** PLUMBING HENDERSON

ENGINEERS MECHANICAL HENDERSON **ENGINEERS**

ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON **ENGINEERS** CONTRACTOR FOGEL ANDERSON

HENDERSON ENGINEERS 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 **TEL** 816.663.8700 **FAX** 816.663.8701 WWW.HENDERSONENGINEERS.COM 1850004412

EXPIRES 12/31/2021

SHEET TITLE

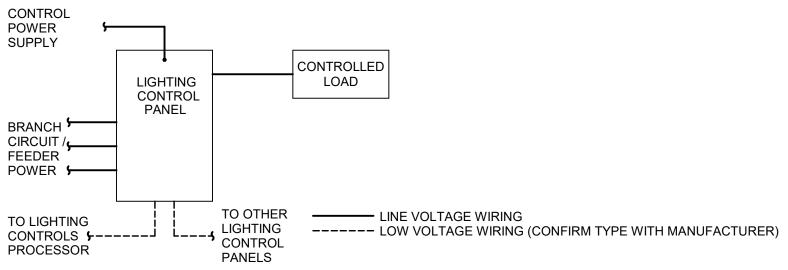
ONE-LINE DIAGRAM AND **SCHEDULES**

SHEET NUMBER

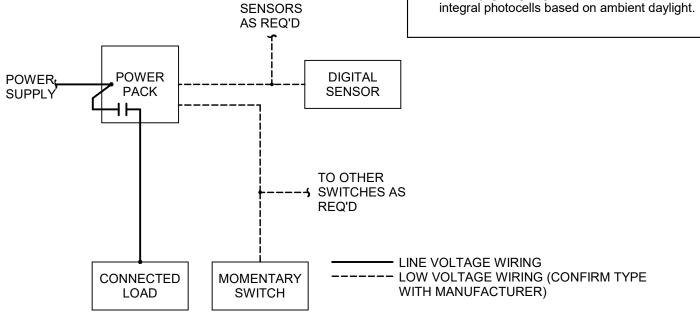
PE	MANUFACTURER	SERIES / MODEL	APPROVED ALTERNATES		LED		DIMMING	VOLTAGE	INPUT	INPUT	DESCRIPTION	NOT
				CRI	CCT	LUMENS	TYPE		WATTS	VA		
	HE WILLIAMS	LT-22-L27/835-AF-DIM-UNV	DAY-BRITE HP90 SERIES	80	3500K	2700	0-10V	120	21	21	2'X2' RECESSED EDGE LIT LED FLAT PANEL TROFFER	
			COLUMBIA LCAT SERIES								NOMINAL 2-3/16" DEPTH.	
			LITHONIA BLT SERIES									
	FOCAL POINT	FLC3D-RT-SW-700L-120V-LD1	ALPHABET ECONU4 SERIES	80	3500K	700	0-10V	120	8	8	3.5" ROUND RECESSED DOWNLIGHT WITH 60 DEGREE CUTOFF	
		LC3-RT-SW-700L-8035K-DNS-WFL-CD-WP	GOTHAM EVO4 SERIES								REFLECTOR AND WIDE FLOOD LENS. TRIMLESS. WHITE FINISH.	
			LITHOLIER LR4 SERIES								PROVIDE WITH INTEGRAL DIMMING DRIVER.	
	SURE-LITES	SEL25	DUALLITE LZ SERIES			109	NON-DIM	120	4	4	TWIN HEAD EMERGENCY LIGHT FIXTURE UL 924 LISTED TO PROVIDE	
			LITHONIA ELM2L SERIES			PER					A MINIMUM OF 109 LUMENS PER HEAD FOR 90 MINUTES.	
			CHLORIDE CLU SERIES			HEAD					MOUNT AT +8'-0" AFF.	
	METALUX	4SNLED-L5-34SL-LC-UNV-L835-CD-1-U-AYC	COLUMBIA MPS SERIES	80	3500K	3400	NON-DIM	120	21	21	4' LINEAR LED STRIP LIGHT SUSPENDED TO +9'-0" AFF IN AREAS WITH	
			LITHONIA ZL1N SERIES								OPEN CEILINGS. CLEAR ROUND LENS.	
			DAY-BRITE FLUXSTREAM									
	METALUX	4SNLED-L5-47SL-LC-UNV-L835-CD-1-U-AYC	COLUMBIA MPS SERIES	80	3500K	4700	NON-DIM	120	34	34	SAME AS TYPE F1 EXCEPT WITH HIGHER LUMEN OUTPUT.	
			LITHONIA ZL1N SERIES									
			DAY-BRITE FLUXSTREAM									
	METALUX	4VT3-LD5-4-G-120V-L835-CD1-U	DAY-BRITE DW SERIES	80	3500K	4000	NON-DIM	120	32	32	4' LINEAR LED STRIP LIGHT WET LOCATION RATED FOR OUTDOOR	
			COLUMBIA LXEM SERIES								USE. MOUNT TO BOTTOM OF CANOPY.	
			LITHONIA VAP LED SERIES									
	FOCAL POINT	FSM4BS-BWFL-625DN-375UP-35K-1C-UNV-LD1-C48-WH-28'	AXIS BEAM 4 SERIES	80	3500K	28000	0-10V	120	238	238	28' LINEAR INDIRECT/DIRECT LED FIXTURE SUSPENDED TO 9'-0" AFF.	
			A-LIGHT ACCOLADE D2								BAT-WING UPLIGHT DISTRIBUTION WITH FLUSH LENS DOWNLIGHT.	
			METALUMEN RAIL 4								PROVIDE WITH INTEGRAL DIMMING DRIVER.	
	FOCAL POINT	FSM4BS-BWFL-625DN-325UP-35K-1C-UNV-LD1-C48-WH-12'	AXIS BEAM 4 SERIES	80	3500K	12000	0-10V	120	102	102	SAME AS TYPE P1 EXCEPT 12' LONG.	
			A-LIGHT ACCOLADE D2									
			METALUMEN RAIL 4									
	MCGRAW-EDISON	IST-SA1-A-735-1-T2-BK	HUBBELL RWL1 SERIES	70	3500K	2802	NON-DIM	120	20	20	EXTERIOR WALL SCONCE WITH TYPE II DISTRIBUTION. MOUNT AT	
			ACUITY ARC SERIES								+9'-0" AFG.	
			GARDCO 101 SERIES									
		-CBP									-E: PROVIDE COLD WEATHER BATTERY PACK UL 924 LISTED TO PROVIDE A MINIMUM OF 1000 LUMENS FOR 90 MINUTES	
	SURE-LITES	EUX71R	DUALLITE LE SERIES	+			NON-DIM	120	1	1	EDGE LIT EXIT SIGN WALL MOUNTED ABOVE DOOR FRAME	
	OUNE EITEO		LITHONIA EDG SERIES				14014-DIIVI	120	1	'	RED LETTERS	
			CHLORIDE 44R SERIES									

ALL LIGHTING CONTROL PANELS IN LAN FOR INTERNET INTERFACE \$-----PARAGON COMPLEX SHALL BE CONTROL POWER SUPPLY -NETWORKED TOGETHER TO OPERATE ON A CENTRALIZED SCHEDULE **NEMA 1 ENCLOSURE** LIGHTING CONTROLS REFER TO LIGHTING CONTROL CONTAINING SEGMENT PROCESSOR PANEL DETAIL FOR MORE MANAGER, NETWORK SWITCHES, AND NETWORK LIGHTING / ROUTERS AS REQUIRED ----- CONTROL F----- TO OTHER LIGHTING PANEL CONTROL PANELS LINE VOLTAGE WIRING ----- LOW VOLTAGE WIRING (CONFIRM TYPE WITH MANUFACTURER)

- REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR DEVICE AND EQUIPMENT SPECIFICATIONS.
- 2. DETAIL IS DIAGRAMMATIC AND IS BASED ON LEGRAND. THIS REPRESENTS THE GENERAL SCOPE OF WORK AND LOCATION OF DEVICES IN RELATION TO EACH OTHER ALONG THE POWER CIRCUIT. DIAGRAMS MAY BE DIFFERENT FOR ALLOWED EQUIVALENT MANUFACTURERS. ELECTRICAL CONTRACTOR SHALL COORDINATE FULL SYSTEM REQUIREMENTS WITH SELECTED MANUFACTURER. PROVIDE ALL PARTS AND PIECES REQUIRED FOR A FULLY FUNCTIONAL SYSTEM. REFER TO FINAL APPROVED MANUFACTURER'S INSTALLATION INSTRUCTIONS AND WIRING DIAGRAMS FOR
- 3. CIRCUITING SHOWN ON PLAN(S) CORRESPONDS TO LIGHTING CONTROL INTENT. IF CIRCUITING IS FIELD-MODIFIED, ENSURE THAT SYSTEM PROGRAMMING WITH REVISED CIRCUITING MEETS ORIGINAL LIGHTING CONTROL INTENT.
- 4. INTEGRAL TIMECLOCK SHALL BE ASTRONOMIC, PROGRAMMABLE WITH 365 DAY / HOLIDAY SCHEDULING, AND HAVE 24 HOUR BATTERY BACK-UP. LIGHTING CONTROL SYSTEM SHALL COMPLY WITH ALL LOCAL AND STATE ENERGY CODES.
- 5. COORDINATE WITH OWNER AND LANDLORD FOR PROGRAMMABLE TIMECLOCK SCHEDULES. PROVIDE GENERAL CONTRACTOR WITH OPERATIONS MANUALS FOR ALL COMPONENTS OF LIGHTING CONTROL SYSTEM.
- PROVIDE SYSTEM COMMISSIONING AS REQUIRED PER ENERGY CODE.
- 3 HYBRID LIGHTING CONTROL DIAGRAM NTS



- 1. REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR DEVICE AND EQUIPMENT SPECIFICATIONS.
- 2. DETAIL IS DIAGRAMMATIC AND IS BASED ON LEGRAND. THIS REPRESENTS THE GENERAL SCOPE OF WORK AND LOCATION OF DEVICES IN RELATION TO EACH OTHER ALONG THE POWER CIRCUIT. DIAGRAMS MAY BE DIFFERENT FOR ALLOWED EQUIVALENT MANUFACTURERS. ELECTRICAL CONTRACTOR SHALL COORDINATE FULL SYSTEM REQUIREMENTS WITH SELECTED MANUFACTURER. PROVIDE ALL PARTS AND PIECES REQUIRED FOR A FULLY FUNCTIONAL SYSTEM. REFER TO FINAL APPROVED MANUFACTURER'S INSTALLATION INSTRUCTIONS AND WIRING DIAGRAMS FOR INSTALLATION.
- 3. CIRCUITING SHOWN ON PLAN(S) CORRESPONDS TO LIGHTING CONTROL INTENT. IF CIRCUITING IS FIELD-MODIFIED, ENSURE THAT SYSTEM PROGRAMMING WITH REVISED CIRCUITING MEETS ORIGINAL LIGHTING CONTROL INTENT. UPDATE LIGHTING CONTROL PANEL SCHEDULE(S) IN RECORD DRAWINGS.
- 4. LEAVE A TYPEWRITTEN SCHEDULE INCLUDING ANY FIELD-MODIFICATIONS IN EACH LIGHTING CONTROL PANEL DOOR.
- 5. PROVIDE SYSTEM COMMISSIONING AS REQUIRED PER ENERGY CODE.
- 6. REFER TO LIGHTING CONTROL PANEL SCHEDULE(S) FOR MORE INFORMATION.



DIAGRAMS FOR INSTALLATION.

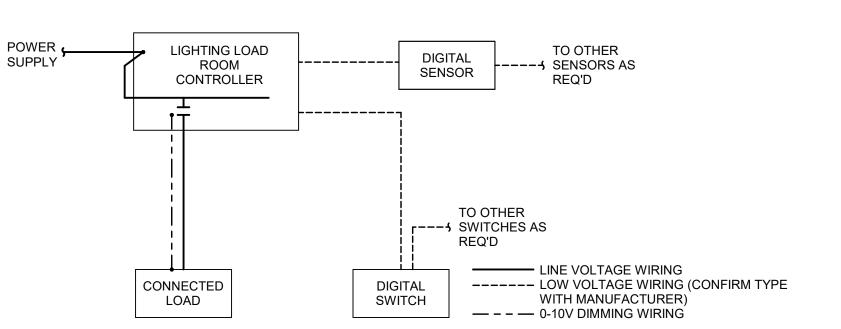
1. REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR DEVICE AND EQUIPMENT SPECIFICATIONS.

TO OTHER

- 2. PROVIDE QUANTITY OF POWER PACKS AS REQUIRED BY MANUFACTURER TO SUPPORT QUANTITY OF SENSORS
- INDICATED ON PLANS. 3. DETAIL IS DIAGRAMMATIC AND IS BASED ON WATTSTOPPER. THIS REPRESENTS THE GENERAL SCOPE OF WORK AND LOCATION OF DEVICES IN RELATION TO EACH OTHER ALONG THE POWER CIRCUIT. DIAGRAMS MAY BE DIFFERENT FOR ALLOWED EQUIVALENT MANUFACTURERS. ELECTRICAL CONTRACTOR SHALL COORDINATE FULL SYSTEM REQUIREMENTS WITH SELECTED MANUFACTURER. PROVIDE ALL PARTS AND PIECES REQUIRED FOR A FULLY

FUNCTIONAL SYSTEM. REFER TO FINAL APPROVED MANUFACTURER'S INSTALLATION INSTRUCTIONS AND WIRING

- 4. CIRCUITING SHOWN ON THE PLAN CORRESPONDS TO THE LIGHTING CONTROL INTENT. IF CIRCUITING IS CHANGED IN THE FIELD, ENSURE THAT SYSTEM PROGRAMMING WITH REVISED CIRCUITING MEETS THE ORIGINAL LIGHTING CONTROL INTENT. UPDATE LIGHTING CONTROL PANEL SCHEDULES IN RECORD DRAWINGS.
- 5. PROVIDE SYSTEM COMMISSIONING AS REQUIRED PER ENERGY CODE.
- OCCUPANCY SENSOR DETAIL SINGLE POWER SUPPY AND SWITCH NTS



- 1. REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR DEVICE AND EQUIPMENT SPECIFICATIONS.
- 2. QUANTITY OF RELAYS SHOWN IS GENERIC. REFER TO PLANS, LIGHTING CONTROL DEVICE SCHEDULE, AND SHOP DRAWINGS FOR FINAL QUANTITY PER ROOM CONTROLLER.
- 3. DETAIL IS DIAGRAMMATIC AND IS BASED ON LEGRAND. THIS REPRESENTS THE GENERAL SCOPE OF WORK AND LOCATION OF DEVICES IN RELATION TO EACH OTHER ALONG THE POWER CIRCUIT. DIAGRAMS MAY BE DIFFERENT FOR ALLOWED EQUIVALENT MANUFACTURERS. ELECTRICAL CONTRACTOR SHALL COORDINATE FULL SYSTEM REQUIREMENTS WITH SELECTED MANUFACTURER. PROVIDE ALL PARTS AND PIECES REQUIRED FOR A FULLY FUNCTIONAL SYSTEM. REFER TO FINAL APPROVED MANUFACTURER'S INSTALLATION INSTRUCTIONS AND WIRING DIAGRAMS FOR INSTALLATION.
- CIRCUITING SHOWN ON THE PLAN CORRESPONDS TO THE LIGHTING CONTROL INTENT. IF CIRCUITING IS CHANGED IN THE FIELD, ENSURE THAT SYSTEM PROGRAMMING WITH REVISED CIRCUITING MEETS THE ORIGINAL LIGHTING CONTROL INTENT. UPDATE LIGHTING CONTROL PANEL SCHEDULES IN RECORD DRAWINGS.
- 5. PROVIDE SYSTEM COMMISSIONING AS REQUIRED PER ENERGY CODE.
- 2 ROOM CONTROLLER DETAIL ON/OFF OR ON/OFF/0-10V DIMMING CONTROL NTS

A. HOURS OF OPERATION General Note: Confirm all sensor time delays with owner				TING CONTROL DEVICE SCHED	_ _		
General Note: Confirm all sensor time delays with owner				LINE-VOLTAGE WALL SWITCH OCCUPANCY SENSORS			
	SYMBOL	MANUFACTURER	ALTERNATE		COVERAGE		
prior to final programming.	TAG	MODEL/SERIES LEGRAND	MANUFACTURER ACUITY, COOPER	DEVICE DESCRIPTION WALL MOUNT DUAL TECHNOLOGY OCCUPANCY SENSOR.	(W X D) PIR MAJOR 30' x 35'	VOLTAGE 120/	NOTES
B. GENERAL REQUIREMENTS	s vs	DW-100	HUBBELL, LEVITON	INTEGRAL MANUAL OVERRIDE SWITCH. SINGLE RELAY. LINE-VOLTAGE.	PIR MINOR 15' x 20'	277	
The building does not have a central time clock. All lights are controlled locally via occupancy sensors,	Φ		LUTRON	LOAD: 120V=800W, 277V=1200W.	ULT MAJOR 20' x 20'		
integral photocells and/or manual control. 2. Emergency Lighting: Emergency egress lighting is	000	LEGRAND	ACUITY, COOPER	WALL MOUNT DUAL TECHNOLOGY OCCUPANCY SENSOR.	ULT MINOR 15' x 15' PIR MAJOR 30' x 35'	120/	
powered from emergency light fixtures.	\$OS2	DW-200	HUBBELL, LEVITON	INTEGRAL MANUAL OVERRIDE SWITCHES. DUAL RELAY. LINE-VOLTAGE.	PIR MINOR 15' x 20'	277	
C. OPEN OFFICE, HALL			LUTRON	LOAD: 120V=800W, 277V=1200W.	ULT MAJOR 20' x 20'		
Manual Control: Occupant can manually control and dim lights via local switch(es).				STAND-ALONE LOW-VOLTAGE LIGHTING CONTROL SYSTEMS	ULT MINOR 15' x 15'		
2. Occupancy: Upon occupancy, lights automatically				STAND-ALONE LOW-VOLTAGE OCCUPANCY SENSORS			
turn on to 50%. Occupant must manually turn on lights to 100%.	SYMBOL TAG	MANUFACTURER MODEL/SERIES	ALTERNATE MANUFACTURER	DEVICE DESCRIPTION	COVERAGE (WXD)	VOLTAGE	NOTES
3. Vacancy: After 20 minutes in any individual zone, lights shall automatically dim to 20%. After 20 minutes	IAG	LEGRAND	ACUITY, COOPER	CEILING MOUNT DUAL TECHNOLOGY OCCUPANCY SENSOR.	PIR MAJOR 36' Ø	24	NOTES
in all control zones, all controlled lights shall turn off.	((2))	DT-300	HUBBELL, LEVITON	360 DEGREE COVERAGE. LOW-VOLTAGE. ISOLATED RELAY.	PIR MINOR 25' Ø		
Daylight: Lighting in daylight zones 'a' and 'b' shall continously dim in response to daylight when control					ULT 36' x 36'		
zone is occupied.				STAND-ALONE LOW-VOLTAGE POWER PACKS			
C. BREAK AREA	SYMBOL	MANUFACTURER	ALTERNATE	DELVIOS DECODIDATION		VOLTAGE	NOTEO
Manual Control: Occupant can manually control and dim lights via local switch(es).	TAG	MODEL/SERIES LEGRAND	MANUFACTURER ACUITY, COOPER	DEVICE DESCRIPTION POWER PACK FOR LOW-VOLTAGE OCCUPANCY SENSORS. 20A LOAD. (1) RELAY.	MANUAL-	VOLTAGE 120/	NOTES
Occupancy: Occupant must manually turn on	0	BZ-250	HUBBELL, LEVITON	AND AUTO-ON MODES. HOLD-ON AND -OFF INPUTS. LOAD: 16A AT 120V OR 277V.		277	
lights. 3. Vacancy: After 20 minutes, all controlled lights				OUTPUT: 225mA AT 24V. PLENUM RATED.			
shall turn off.				STAND-ALONE LOW-VOLTAGE SWITCHES			
D. SERVER ROOM, STORAGE, WATER SERVICE	SYMBOL	MANUFACTURER	ALTERNATE			\(\alpha\)	NOTES
Manual Control: Occupant can manually control lights via local switch(es).	TAG	MODEL/SERIES LEGRAND	MANUFACTURER ACUITY, COOPER	DEVICE DESCRIPTION MOMENTARY 1-BUTTON DECORATOR SWITCH FOR MANUAL ON/OFF CONTROL O	F STAND-	VOLTAGE 24	NOTES
Occupancy: Occupant must manually turn on lights.	\$ LV	DCC2	HUBBELL, LEVITON	ALONE LOW-VOLTAGE OCCUPANCY SENSORS. INTEGRAL LED ILLUMINATES WHE	EN LOAD IS		
3. Vacancy: After 20 minutes, all controlled lights				ON.			
shall turn off.				NETWORK LIGHTING CONTROL SYSTEMS			
D. JANITOR 1. Manual Control: Occupant can manually control				NETWORK OCCUPANCY SENSORS			
lights and exhuast fan via local switch(es).	SYMBOL TAG	MANUFACTURER MODEL/SERIES	ALTERNATE MANUFACTURER	DEVICE DESCRIPTION	COVERAGE (WXD)	VOLTAGE	NOTES
Occupancy: Occupant must manually turn on lights and exhaust fan.	F	LEGRAND	ACUITY, CRESTRON	CEILING MOUNT DUAL TECHNOLOGY OCCUPANCY SENSOR.	PIR MAJOR 32' Ø	24	NOTES
Vacancy: After 20 minutes, all controlled lights and exhaust fan shall turn off.	((1))	LMDC-100	ETC, HUBBELL	360 DEGREE COVERAGE. DIGITAL. (2) RJ45	PIR MINOR 15' Ø		
				PORTS. IR TRANSCEIVER FOR WIRELESS SETUP.	ULT MAJOR 25' x 25'		
RESTROOM Manual Control: Occupant can manually control				NETWORK DAYLIGHT SENSORS			
lights and exhuast fan via local switch(es).	SYMBOL TAG	MANUFACTURER MODEL/SERIES	ALTERNATE MANUFACTURER	DEVICE DESCRIPTION		VOLTAGE	NOTES
Occupancy: All controlled lights and exhuast fan shall automatically turn on.	IAG	LEGRAND	ACUITY, CRESTRON	CLOSED LOOP DAYLIGHT SENSOR FOR (1) ZONE. ON/OFF SWITCHING, BI-LEVEL,	TRI-LEVEL,	24	NOTES
Vacancy: After 20 minutes, all controlled lights and exhuast fan shall turn off.	0	LMLS-400	ETC, HUBBELL	OR CONTINUOUS DIMMING. CEILING MOUNTED. 0-6,500 FC. DIGITAL. (1) RJ45 POR	т.		
F. ELECTRICAL				IR TRANSCEIVER FOR WIRELESS SETUP.			
Manual Control: Occupant can manually control		LEGRAND	ACUITY, CRESTRON	DIGITAL INPUT MODULE WITH EXTERIOR PHOTOELECTRIC SWITCH. FACE SENSO	DR NORTH	24	
lights via local switch(es).	0	LMIO-301 / LMPO-200	ETC, HUBBELL	NORTH AND ORIENT WITH HOOD ABOVE LENS. 0-200 FC. (2) RJ45 PORTS.			
G. EXTERIOR		LIVIFO-200					
Daylighting: Light fixtures shall be controlled via integral photocells based on ambient daylight.	CVMPOL	MANUFACTURER	ALTERNATE	NETWORK ROOM CONTROLLERS (POWER PACK)			
	SYMBOL TAG	MODEL/SERIES	MANUFACTURER	DEVICE DESCRIPTION		VOLTAGE	NOTES
		LEGRAND	ACUITY, CRESTRON	DIGITAL ROOM CONTROLLER FOR ON/OFF/0-10V DIMMING CONTROL OF LIGHTING		120/	
	R1	LMRC-211 (0-10V)	ETC, HUBBELL	(1) 20A LOAD INPUT, (1) RELAY OUTPUT. 100mA SINK PER RELAY. MANUAL-, PART AND AUTO-ON MODES.	IAL-,	277	
		(8 181)		7.1.1.2.7.6.7.6 SIX III.62.2.6.			
		LEGRAND	ACUITY, CRESTRON	DIGITAL ROOM CONTROLLER FOR ON/OFF/0-10V DIMMING CONTROL OF LIGHTING	G LOADS.	120/	
	R3	LMRC-213 (0-10V)	ETC, HUBBELL	(1) 20A LOAD INPUT, (3) RELAY OUTPUTS. 100mA SINK PER RELAY. MANUAL-, PARTIAL-, AND AUTO-ON MODES.		277	
	SYMBOL	MANUFACTURER	ALTERNATE	NETWORK LIGHTING SWITCHES			
	TAG	MODEL/SERIES	MANUFACTURER	DEVICE DESCRIPTION		VOLTAGE	NOTES
IE VOLTAGE WIRING	40	LEGRAND LMSW-104	ACUITY, CRESTRON ETC. HUBBELL	DIGITAL 4-BUTTON SWITCH FOR MANUAL ON/OFF AND SCENE CONTROL. EACH B HAS INTEGRAL LED THAT ILLUMINATES WHEN LOAD IS ON. (2) RJ45 PORTS. IR TR		24	
W VOLTAGE WIRING W VOLTAGE WIRING (CONFIRM TYPE	\$ ^{4B}	LIVIOVV-104	LTO, HODDELL	FOR WIRELESS SETUP. SWITCH DESIGNATIONS VARY PER PROJECT; REFER TO			
TH MANUFACTURER)				PLANS AND/OR SWITCH SCHEDULE FOR PROGRAMMING.			
	1B │	LEGRAND LMDM-101	ACUITY, CRESTRON ETC. HUBBELL	DIGITAL SWITCH FOR MANUAL ON/OFF/DIMMING CONTROL. INTEGRAL LED ILLUM WHEN LOAD IS ON. (2) RJ45 PORTS. IR TRANSCEIVER FOR WIRELESS SETUP.	INATES	24	
	Ψ		·				
QUIPMENT SPECIFICATIONS.				NETWORK AUXILIARY LIGHTING EQUIPMENT			
RER TO SUPPORT QUANTITY OF SENSORS	SYMBOL	MANUFACTURER	ALTERNATE	NE TONCAGALIANT LIGHTING EQUIPMENT			
RESENTS THE GENERAL SCOPE OF WORK AND	TAG NONE	MODEL/SERIES LEGRAND	MANUFACTURER ACUITY, CRESTRON	DEVICE DESCRIPTION WIRELESS CONFIGURATION TOOL WITH USB. 2-WAY IR COMMUNICATION FOR DA	TA LIDI OAD	VOLTAGE BATTERY	NOTES
VER CIRCUIT. DIAGRAMS MAY BE DIFFERENT FOR	NONE	LMCT-100	ETC, HUBBELL	DOWNLOAD, CONFIRMATION, AND STORAGE. OLED SCREEN. PROVIDE ONE TOO	·	BAITERY	
SHALL COORDINATE FULL SYSTEM TS AND PIECES REQUIRED FOR A FULLY				SYSTEM AND LEAVE WITH OWNER. (3) AAA BATTERIES INCLUDED.			
INSTALLATION INSTRUCTIONS AND WIRING	GENERAL NO	ES:					
		_	SIGNED FROM BASIS-OF-	DESIGN COVERAGE PATTERNS. IF SUBMITTING ALTERNATE PER 'EQUIVALENT MAI	NUFACTURER'		
ONTROL INTENT IF CIRCUITING IS CHANGED IN	İ	DJUST SENSOR QUANT	TITIES AND LOCATIONS P	ER MANUFACTURER-SPECIFIC SPACING CRITERIA.			
CONTROL INTENT. IF CIRCUITING IS CHANGED IN CUITING MEETS THE ORIGINAL LIGHTING	,						
	B. PROVIDE SH	OP DRAWINGS FOR EN		T REVIEW THAT INCLUDE PRODUCT CUTSHEETS AND PROJECT-SPECIFIC LAYOUTS ON, AND COVERAGE AREAS, SHOW COORDINATION WITH ALL OTHER CEILING DEV			
CUITING MEETS THE ORIGINAL LIGHTING	B. PROVIDE SH MUST INCL	OP DRAWINGS FOR ENJUDE SENSOR LOCATION	NS, HEIGHTS, ORIENTATI	T REVIEW THAT INCLUDE PRODUCT CUTSHEETS AND PROJECT-SPECIFIC LAYOUTS ON, AND COVERAGE AREAS. SHOW COORDINATION WITH ALL OTHER CEILING DEV RN GRILLES, SPRINKLERS, LIGHT FIXTURES, AND OTHER OWNER-PROVIDED CEILIN	CES		
CUITING MEETS THE ORIGINAL LIGHTING	B. PROVIDE SH MUST INCLU INCLUDING DEVICES SU	HOP DRAWINGS FOR EN JDE SENSOR LOCATION BUT NOT LIMITED TO H JCH AS SPEAKERS, SEC	NS, HEIGHTS, ORIENTATI IVAC SUPPLY AND RETUF CURITY CAMERAS, PROJI	ON, AND COVERAGE AREAS. SHOW COORDINATION WITH ALL OTHER CEILING DEV	ICES G MOUNTED		

- D. VERIFY COLOR(S) FOR ALL WALL AND CEILING MOUNTED DEVICES WITH THE ARCHITECT. E. ALL WALL SWITCH AND CEILING SENSORS SHALL HAVE AN ADJUSTABLE TIME DELAY RANGE OF 0-30 MIN, UNO. CONFIRM SENSOR SETTINGS WITH
- SEQUENCE OF OPERATIONS AND OWNER PRIOR TO SYSTEM COMMISSIONING. F. PROVIDE COPIES OF OPERATION AND MAINTENANCE INSTRUCTIONS FOR ALL DEVICES TO OWNER.
- G. PROVIDE A NEUTRAL CONDUCTOR TO ALL WALL SWITCH LOCATIONS PER NEC REQUIREMENTS. H. DO NOT SHARE NEUTRAL CONDUCTOR ON LOAD SIDE OF DIMMERS.

MULTI-BUTTON SWITCH SCHEDULE **NOTE: PROVIDE FACTORY BUTTON ENGRAVING FOR ALL MULTI-BUTTON SWITCHES WITH MORE THAN ONE BUTTON UNLESS NOTED OTHERWISE. REFER TO BUTTON LABEL COLUMN FOR TEXT. OFFICE ON/OFF/RAISE/LOWER Zones a, b, c, d SOUTH CENTER ON/OFF NORTH ON/OFF Zone c

* SCHEDULE ONLY APPLIES TO OPEN OFFICE. '1B' SWITCH IN BREAK ROOM APPLIES ONLY TO LIGHTS IN THE BREAK ROOM

PANEL N	AME:	LCP	MOUNTING:	SURFACE	
LOCATIO	N:	ELECTRICAL ROOM	VOLTAGE:	120V	
RELAY	CIRCUIT	LOAD CONTROLLED	MODULE	LOAD	ZONE
			TYPE	(WATTS)	
1	B-48	EXTERIOR LIGHTING	NON-DIM	366	
2	B-47	HOLIDAY LIGHTS	NON-DIM	360	
3		SPARE			
4		SPARE			
NOTE: RE	LAY NUMBER	ING ON SCHEDULE IS INTENDED TO COMMUNICATE DESIGN	INTENT AND IS FOR		
INFORMA	TIONAL PURF	POSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR COOR	DINATING FINAL RELAY	•	
CONFIGU	RATION WITH	LIGHTING CONTROL VENDOR AND FIELD CONDITIONS.			

PROVIDE WITH EXTERIOR PHOTOCELL ON NORTH FACING WALL. REFER TO LIGHTING PLANS

LOT 20 - HUB

3151 NW PARAGON PKWY

Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET REVISIONS

REGISTRATION



ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL

HOERR SCHAUDT /

BSE STRUCTURAL

ENGINEERS

HENDERSON

STRUCTURAL BSE STRUCTURAL ENGINEERS

FOUNDATIONS

MECHANICAL

PLUMBING HENDERSON **ENGINEERS**

ENGINEERS ELECTRICAL HENDERSON

ENGINEERS FIRE PROTECTION HENDERSON

ENGINEERS CONTRACTOR FOGEL ANDERSON

HENDERSON ENGINEERS 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 TEL 816.663.8700 FAX 816.663.8701 WWW.HENDERSONENGINEERS.COM 1850004412

EXPIRES 12/31/2021

SHEET TITLE LIGHTING **FIXTURE** SCHEDULE AND CONTROLS

A. GENERAL REQUIREMENTS All requirements under Division 01 and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01. all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each system as implied by the design and the equipment specified.

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the Work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

2004 Edition	1995 Edition
Division 21 – Fire Suppression	Division 15
Division 22 – Plumbing	Division 15
Division 23 – HVAC	Division 15
Division 26 – Electrical	Division 16
Division 27 – Communications	Division 16
Division 28 – Electronic Safety and Security	Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations."

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Provide: "to furnish and install."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division.

Engineer: Where referenced in this Division, "Engineer" is the Engineer of the Architect and Engineer for final resolution. Contractor will be held Record and the Design Professional for the work under this division, and is responsible for any violation of the law. a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.

over this project. Nationally recognized testing laboratories and standards remain if allowed by the AHJ, Engineer and Owner. listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ H. PROTECTION OF EQUIPMENT AND MATERIALS and standards that meet the specified criteria.

Homerun: That portion of an electrical circuit originating at a junction box, termination box, receptacle, or switch with termination at an electrical branch circuiting loads, the originating point of the homerun shall be at the conditions, cover with waterproof, tear-resistant, heavy tarp or first load in the circuit or at a junction box located in an accessible ceiling space as close as possible to the first load.

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

 Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms. 2. Substitutions for convenience: changes proposed by contractor or noise from being transmitted to adjacent areas. Remove protection and owner that are not required in order to meet other project requirements but barriers after demolition operations are complete. may offer advantage to contractor or owner.

When 'furnish', 'install', 'perform', or 'provide' is not used in connection with construction when not in use to prevent the entrance of debris into the services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer Materials, products, equipment, and systems described in the Bidding as equivalent to the item or manufacturer specified". The term "approved" Documents establish a standard of required function, dimension, shall mean labeled, listed, certified, or all three, by an NRTL, and acceptable to the AHJ over this project.

C. PRE-BID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully equipment, or system that is proposed to be substituted. The burden of informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

D. MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model numbers.

Provide markings or a nameplate for all material and equipment identifying the manufacturer and providing sufficient reference to establish quality, size, and capacity. All workmanship shall be of the finest possible by experienced mechanics of the proper trade. In general, provide the following quality grade(s) for all materials and equipment.

Commercial specification grade

Provide all hoists, scaffolds, staging, runways, tools, machinery, and equipment required for the performance of the electrical work. Store and maintain material and equipment in clean condition, and protected from weather, moisture, and physical damage.

Furnish only material and equipment that are listed, labeled, certified, or all three, by an NRTL whenever any listing or labeling exists for the types of material and equipment specified.

At a minimum, general work practices for electrical construction shall be in accordance with NECA 1 (latest edition), "Standard Practices for Good Workmanship in Electrical Construction".

E. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where a list is provided, manufacturers are listed alphabetically and not in point-by-point calculations at the discretion of the engineer. accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to

compliance with requirements from manufacturers that have been actively Assemble and submit for review shop drawings, material lists, involved in manufacturing the specified product for no less than 5 years.

F. COORDINATION Coordinate all work with other divisions and trades so that various components of the systems are installed at the proper time, fit the available space, and allow proper service access to those items requiring

maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner. All roof penetrations, floor chasing and/or core drilling shall require the this section and division take precedence. Become thoroughly familiar with specific approval of the Landlord and Owner. All work in common areas. shafts or other Landlord owned spaces must be reviewed and approved by the Landlord and Owner prior to commencement of the work. Contractor shall minimize any disruption and disturbances to other

tenants. All work within other tenant spaces must be coordinated with and

approved by the Landlord and Owner. of the Engineer. If the Contractor desires to use elements of such product, Jnless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute work in a manner as to not interfere with or

Figured dimensions shall be taken in preference to scale dimensions. scope of work, indicating the intended general arrangement of the systems Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.

> Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim. Make all offsets required to clear equipment, beams, and other structural members, and to facilitate concealing raceways in the manner anticipated in the design. Provide materials with trim that will fit properly the types of ceiling, wall, or floor finishes actually installed.

Coordinate all work with Architectural phasing drawings to properly stage transitions of work to provide power to existing, new and temporary loads. Monitor loads on distribution system to ensure shifting of loads does not overload electrical equipment.]

G. ORDINANCES AND CODES

affected by connection of services.

delay the work of other trades

Work performed under this contract shall, at a minimum, be in conformance with applicable national state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following:

National Fire Protection Association (NFPA) Underwriters Laboratories (UL)

Occupational Safety and Health Administration (OSHA) American National Standards Institute (ANSI) American Society of Testing Materials (ASTM) Rules and regulations of public utilities and municipal departments

Other national standards and codes where applicable. Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent.

Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of

Procure and pay for permits and licenses required for the accomplishment this division, Engineer means increased involvement by and obligations to of the work herein described. Where required, obtain, pay for, and furnish the Engineer, in addition to involvement by and obligations to the Architect. certificates of inspection to Owner. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety

Electrical equipment shall be located so that the code required minimum NRTL: Nationally Recognized Testing Laboratory, as defined and listed by working clearance and dedicated electrical space are maintained. Existing OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ equipment not meeting current code required clearance requirements may wiring diagrams, parts lists, approved submittals and shop drawings,

Store and protect from damage equipment and materials delivered to job site. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in panelboard. Note: Where MC cable is utilized for receptacle and/or lighting conditioned spaces. For materials and equipment not susceptible to these polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment and material damaged by construction activities shall be rejected, and Contractor shall furnish new equipment and material of a like kind at his own expense.

> Keep premises broom clean of foreign material created during work performed under this contract. Conduit, equipment, etc. shall have a neat and clean appearance at the termination of the work.

Protect adjacent materials indicated to remain. For work specific to this Division, install and maintain dust and noise barriers to keep dirt, dust, and N.

Plug or cap open ends of conduits while stored and installed during

I. SUBSTITUTIONS

appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request From for each material, product, proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following:

Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances,

maintenance service, and sourcing of replacement parts. Proposed substitution has received necessary approvals of authorities having jurisdiction.

Same warranty will be furnished for proposed substitution as for specified

If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear or Owner.

Coordination, installation and changes in the Work as necessary for

accepted substitution will be complete in all respects.

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents.

Provide factory generated point-by-point calculations for all exterior ligh fixtures (photometric files supplied so the engineer can generate a pointby-point do not suffice for the point-by-point calculations). Provide interior

J. SUBMITTALS manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Prior to transmitting submittals, verify that the equipment submitted is mutually compatible with and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration,

Transmit submittals as early as required to support the project schedule.

submit a shop drawing showing the proposed layout.

Allow two weeks for Engineer review time, plus to/from mailing time via to 7 percent air entrainment. the Architect, plus a duplication of this time for resubmittals, if required. Only resubmit those sections requested for resubmittal. Unless otherwise specified or shown on the structural drawings, reinforce equipment bases with No. 4 reinforcing bars conforming to ASTM A615 or 6x6 – W2.9 x W2.9 welded wire mesh conforming to ASTM A185. Place reinforcing bars 24 inches on center with a minimum of two bars each

> Provide galvanized anchor bolts for equipment placed on concrete bases or on concrete slabs. Anchor bolts size, number, and placement shall be as recommended by the manufacturer of the equipment.

Submittals shall contain the project name, applicable specification section, C. SUPPORT SYSTEMS

Steel Slotted Support Systems (Slotted Channel): Comply with MFMA-3, submittal has been checked by the Contractor, complies with the drawings factory-fabricated components for field assembly; 12-gauge, 1-5/8-inch by

mark, list, or indicate the materials, performance criteria, and accessories Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane or polyester coating applied according to MFMA-3. Painted Coatings: Manufacturer's standard painted coating Submittals and shop drawings shall not contain firm name, logo, the seal, or signature of the Engineer. They shall not be copies of the work product applied according to MFMA-3.

Aluminum Slotted Support Systems (Slotted Channel): Comply with MFMA-3, Type 6063-T6, per ASTM B221; factory-fabricated

components for field assembly; 12-gauge, 1-5/8-inch by 1-5/8-inch. Manufacturers: Cooper B-Line, ERICO International, Hilti, Power-Strut. Thomas and Betts, or Unistrut.

Where field cutting of standard lengths of channel are required, make cuts out inapplicable items. Shop drawings will be returned without review if the straight and perpendicular to manufactured surfaces. For field-cut or damaged surfaces of coated channels, dress cut ends,

damaged surfaces, or both, with an abrasive material (e.g., file, grinding

stone, or similar) and cleanser to remove oils, rust, sharp edges, and

For channel with a factory-applied coating, re-finish cut edges with a coating compatible with the factory finish and as recommended by the manufacturer (e.g., manufacturer's touch-up paint or zinc-rich cold-

ACCESS DOORS

Provide access doors for all concealed equipment where indicated or as required, except where above lay-in ceilings. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction for the type of construction in which it is installed. Obtain Architect's approval of type, size, location and color before ordering. Provide factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation, concealed hinges, flush screwdriver-operated cam lock, and anchor straps. Provide access doors manufactured by: Bar-Co, J.L. Industries, Karp Associates, Milcor, Nystrom Building Products, Wade, or

PENETRATIONS

of fire-stopping specified in Division 07 section "Through-Penetration

Coordinate all roof penetrations with Engineer, Owner, and as applicable, the roofing contractor providing a roof warranty. Keep all raceway penetrations within mechanical equipment curbs wherever possible. Coordinate with Division 01. Flash and counterflash all openings through roof, and/or provide pre-fabricated molded seals compatible with the roof construction installed, or as required by the Engineer, Owner, or roofing contractor. All roof penetrations shall be leaktight at the termination of the work and shall not void any new or existing roof warranties.

Steel Pipe Sleeves for Raceways and Cables: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends, and drip Cast-Iron Pipe Sleeves for Raceways and Cables: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052 inch thickness and of length to suit application

FIRESTOPPING

Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL acceptable to AHJ.

Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United States Gypsum Company, or 3M corp. Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation

drawing for each penetration fire stop system. Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration Refer to Division 01 for acceptance of electronic manuals for this project. firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include

qualifications data for testing agency. EQUIPMENT FURNISHED BY OTHERS

Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation of equipment furnished by others in locations as indicated on the drawings, specified herein, or both. Equipment and accessories not provided by the equipment size for pulling of wire, not smaller than code requirements and not less Provide training to include, but not be limited to, an overview of the system supplier may include, but not be limited to, flexible cords and plugs as required for proper operation of the complete system, in accordance with the manufacturers' instructions.

Contractor shall be responsible for correct rough-in dimensions, and verify Protect all raceway installations against damage during construction. them with Architect and/or equipment supplier prior to rough-in and service Repair all raceways damaged or moved out of line after roughing-in to

SYSTEM TESTING AND ADJUSTING

Adjust, align, and test all electrical equipment on this project provided under this division and all electrical equipment furnished by others for installation or wiring under this division for proper operation.

ATS (latest edition) and all additional requirements specified in following Maintain the following on the project premises at all times: a true RMS reading voltmeter, a true RMS reading ammeter, and a megohmmeter

insulation resistance tester. Provide test data readings as requested or as required by the Engineer. **EQUIPMENT IDENTIFICATION**

Provide equipment identification nameplates on all panelboards, electrical equipment enclosures, access doors, disconnect switches, enclosed circuit breakers, and feeder devices in distribution panelboards.

Engraved, contrasting color, three-layer, laminated plastic, indicating the name of the equipment, load, or circuit as designated on the drawings and in the specifications: Field-applied permanent epoxy adhesive, compatible with the Self-adhering, with a permanent weatherproof adhesive. Attached with stainless steel screws and hardware.

Attachment method shall be acceptable to the manufacturers of the equipment to which the nameplates are being applied.

Nameplate Color: Black background with white letters for Normal Power; Red background with white letters for Emergency Power.

Letter height: 3/8-inch minimum. SYSTEM START UP

Perform the following prior to starting up the electrical systems Check all components and devices and lubricate items

Tighten screws and bolts for 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 Adjust taps on each transformer for rated secondary voltage when the transformer is at minimum load. Check and record building's service entrance voltage, grounding conditions, grounding resistance, and proper phasing. Replace all burned-out lamps and lamps used for temporary

After all systems have been inspected and adjusted, confirm all

operating features required by the drawings and specifications and make final adjustments as necessary.

END OF SECTION 26

construction lighting in permanent light fixtures.

Division 26: BASIC ELECTRICAL MATERIALS AND METHODS

RACEWAYS

METALLIC CONDUIT AND TUBING

Electrical Metallic Tubing, Couplings, and Fittings (EMT): ANSI C80.3, UL 797. Only steel products allowed. Reduced wall EMT is not allowed. Flexible Metal Conduit (FMC): Zinc-coated steel or aluminum, UL 1.

Intermediate Metal Conduit (IMC): Hot-dip Galvanized Rigid Steel Conduit,

Liquidtight Flexible Metal Conduit (LFMC): Flexible steel conduit with PVC jacket, UL 360; fittings: NEMA FB 1. Rigid Metal Conduit (RMC):

Rigid Aluminum Conduit (RAC): ANSI C80.5, UL 6A. Plastic-Coated IMC, RMC, and Fittings: NEMA RN 1, NRTL listed. Coating thickness of 0.04 inches minimum.

Manufacturers: AFC Cable, Alflex, Anamet Electrical, Electri-Flex, Indalex, Manhattan/CDT/Cole-Flex, O-Z/Gedney, Republic Raceway, Tyco International, Western Tube and Conduit, or Wheatland Tube.

NON-METALLIC CONDUIT AND TUBING

and material NRTL listed Manufacturers: AFC Cable, American International, Anamet Electrical, Amco, Cantex, Certainteed, Condux International, Elecsys, Electri-Flex, Lamson and Sessions, Manhattan/CDT/Cole-Flex, Prime Conduit, Raco, Spiralduct, Superflex Ltd, or Thomas and Betts. RACEWAY INSTALLATION

GENERAL RACEWAY INSTALLATION REQUIREMENTS Install raceways parallel and perpendicular to building lines.

Install raceways to requirements of structure, to requirements of all other work on the project, and to clear all openings, depressions, pipes, ducts, reinforcing steel, and other immovable obstacles.

installation will not affect the strength of the structure. Except where approved in writing by the Engineer, install no raceway in a slab-on-grade. Locate raceway below granular fill below slabs-on-grade.

Install raceways set in forms for concrete structure in such a manner that

Install raceways a minimum of 24" below bottom of slab/paving/grade

where practicable. Install raceways continuous between connections to outlets, boxes, and cabinets with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between connections. Use manufactured elbows for all 45- and 90-degree bends, unless approved by the Engineer in advance. Make other bends smooth, even and without flattening raceway or flaking galvanizing or enamel. Radii of bends shall be

Conceal raceways from view unless noted or approved otherwise. Route raceways serving rooftop equipment inside equipment curb and

as long as possible and never shorter than the corresponding trade elbow.

minimize roof penetrations and exterior raceway runs. Support raceway from structure, do not support from the roof decking. Maintain 2" spacing between the raceway and roof deck to prevent roofing screws from penetrating raceway. Do not route raceways across skylights or other roof

Route all exposed non-flexible raceways tight to structure, parallel to building lines in strut or cable tray where practicable. Install raceways plumb/level where exposed to view.

Use long radius elbows for all underground installations, where necessary or where otherwise indicated. though "circuit runs" were indicated in their entirety.

Securely fasten raceways in place with approved straps, hangers, and steel supports as required. Attach raceway supports to the building structure. Hang single raceways for feeders with malleable split ring hangers with rod and turnbuckle suspension from inserts spaced not over 10 feet apart in construction above. Clamp groups of horizontal feeder raceways to steel channels that are suspended from inserts spaced not over 10 feet apart in construction above. Securely clamp vertical feeder raceways to structural steel members attached to structure. Install cable clamps for support of vertical feeders where required. Add raceway supports within 12 inches of all bends, on both sides of the bends. Do not support raceways from suspended ceiling components.

Ream raceway ends, thoroughly clean raceways before installation, and keep clean after installation. Plug or cover openings and boxes as required to keep raceways clean during construction and fish all raceways clear of obstructions before pulling conductor wires. Provide raceways of ample than 1/2-inch in size, unless indicated otherwise on Drawings. Homeruns containing more than one branch circuit shall not be less than 3/4-inch in

meet Engineer's approval without additional cost to the Owner.

Align and install true and plumb all raceway terminations at panelboards, ritchboards, motor control equipment, and junction boxes.

Install approved expansion/deflection fittings where raceways pass through (if embedded) or across (if exposed) expansion joints, and when using RNC or RAC in exposed environments in accordance with NFPA 70 and expansion/contraction properties of RNC or RAC.

Install a pull wire in each empty raceway that is left for installation of conductors or cables under other divisions or contracts. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 24 inches of slack at each end of pull wire. Terminate all conduit stub-ups with nylon bushings.

Make all joints and connections in a manner that will ensure mechanical strength and electrical continuity.

Coordinate raceway routing and installation with other trades prior to roughin and installation.

ABOVE GROUND RACEWAY USE: Install all circular raceways concealed above suspended ceilings or

concealed in walls or floors wherever possible except where otherwise indicated. Provide GRS for all conduits exposed to weather or other hazardous conditions. Unless noted otherwise, all other raceway may be EMT where approved by local code. Use compression type fittings for EMT, with all fittings NRTL

listed for the environment in which they are used. Unless noted otherwise, set-screw type fittings are not allowed.

UNDERGROUND RACEWAY USE: Provide GRS installed below grade with a corrosion-resistant bondedplastic or approved mastic coating. This shall include the 90-degree elbow below grade and the entire vertical transition to above grade.

RNC conduit may be used underground where permitted by local code and

where not specifically restricted by these documents. When used, provide

plastic-coated GRS, as specified above, for all bends greater than 30

degrees, including the 90-degree elbows below grade and the entire vertical risers for transitions from below to above grade or above slab. All site electrical conduits shall be 1" minimum, unless noted otherwise.

EQUIPMENT CONNECTIONS Use FMC for final connection to each motor, transformer, and any device that would otherwise transmit motion, vibration, or noise. Use LFMC where exposed to liquids, vapors, or sunlight. Provide all FMC and LFMC with an insulated bonding conductor.

Use only metal raceways for all power wiring from the output of variable frequency drives to their respective motors.

E. BUSHINGS AND LOCKNUTS

subject to vibration and/or moisture, or when required by NFPA 70.

Provide nylon bushings for all communications and low voltage wiring

Conductor Insulation Types: 90-degree C-rated, Type THHN/THWN-2 or

All feeder and branch circuit conductors No. 8 AWG and larger: Stranded.

XHHW-2 complying with ICEA S-95-658/NEMA WC70.

All conductors, No. 10 AWG and smaller: Solid copper.

Gage (AWG - Brown and Sharpe).

raceway, and a 20A circuit breaker.

noted otherwise.

sharp, clean-cut threads.

E. PROHIBITED USE OF MC CABLE UNLESS NOTED ABOVE Rigidly terminate conduits entering sheet metal enclosures to the enclosure Examples of those uses include, but are not limited to the following: with a bushing and locknut on the inside and a locknut or an approved hub Homeruns to panelboards (refer to Section 26: Definitions). on the outside. Conduit shall enter the enclosure squarely. Where exposed to view.

Where exposed to damage. Provide bushings and locknuts made of galvanized malleable iron with Hazardous locations. Where EMT enters a box, provide approved EMT compression

Wet locations. When restricted otherwise.

When specifically disallowed by the local AHJ. Circuits supplied by an emergency or standby power source.

Use insulated, grounding, or combination bushings wherever connection is F. MC CABLE INSTALLATION Secure and support cable per NFPA 70 Article 330. Secure cable within 12

> exceed six feet. Maintain consistent spacing to avoid derating due to bundling per NFPA 70 Section 310.15. Utilize steel cable hangers, Arlington SMC series or equivalent, to support wherever possible so cables can be routed in a neat and workmanship like manner.

inches of every box or fitting. Securing and supporting intervals shall not

4 JUNCTION BOXES, PULL BOXES, CABINETS, AND WIREWAYS

Provide junction boxes, pull boxes, cabinets, and wireways wherever necessary for proper installation of various electrical systems according to NFPA 70 and where indicated on the drawings. Size as required for the specific function or as required by NFPA 70, whichever is larger. Sizes of conductors and cables indicated or specified are in American Wire Construction shall be of a NEMA design suitable for the environment

> Junction boxes installed behind wall cases and in or on other store fixtures. except where otherwise specified, shall be 4 inches square or larger with galvanized covers Horizontally mount junction boxes under center fixtures (and cases), handy

boxes or 4-inch square boxes with tops of boxes not more than 3-1/2 inches above the floor. Size junction boxes to adequately contain all required conductors and splices. OUTLET BOXES

All outlets including light fixture, switch, receptacle, and similar outlets: galvanized steel knockout boxes, suitable in design to the purpose they serve and the space they occupy. Size as required for the specific function or as required by NFPA 70, whichever is larger. Set all outlet boxes in walls, columns, floors, or ceilings so they are flush with the finished surface, accurately set, and rigidly secured in position. Provide plaster rings, extension rings and/or masonry rings as required for flush mounting. Provide approved cast outlet boxes with hubs and weatherproof covers in all areas subject to damp, wet, or harsh conditions.

Manufacturers: Appleton, Cooper, Erikson Electrical, Hoffman, Killark Electric, O-Z/Gedney, Raco, Robroy Industries, Scott Fetzer, Spring City Electrical, Thomas and Betts, Walker Systems, or Woodhead. OUTLET LOCATIONS

Coordinate locations of outlet boxes. Outlets are only approximately

located on the small scale drawings. Use great care in the actual location

Unless indicated otherwise, install vertically with the ground slot mounted

Mechanical and electrical equipment rooms and janitors closets: mount

by consulting the various large scale detailed drawings used by other division trades, and by securing definite locations from the Architect. MOUNTING HEIGHTS

Unless noted otherwise, install wiring devices vertically aligned at height indicated on construction drawings. RECEPTACLES

Where installed horizontally, install with the neutral slot mounted at the top. Above counter: mount vertically aligned.

Garages: mount vertically aligned. Where wiring is indicated as installed, but the connection is indicated "FUTURE" or "BY OTHER DIVISION, TRADES, OR CONTRACTS", leave Weatherproof exterior receptacles: horizontally aligned a minimum 3-foot "Pigtail" at the box, tape the ends of the conductors, and

GFCI receptacles: Same as general receptacles.

vertically aligned.

are at block joints.

Clock Receptacles: 84 inches above finished floor Concrete Block Walls: As long as ADA requirements are maintained, dimensions above may be adjusted slightly as required to compensate for variable joint dimensions such that bottom or top of boxes, as applicable.

SWITCHES General: All switches shall be mounted at the same height throughout the project unless noted otherwise. When multiple home runs are combined into a single raceway such that the Above Counters: Same as for receptacles.

> dimensions above may be adjusted slightly as required to compensate for variable joint dimensions, such that bottom or top of boxes, as applicable, are at block joints. Walls with Wainscoting: 6 inches minimum above wainscoting, but not

Concrete Block Walls: As long as ADA requirements are maintained,

exceeding 48 inches above finished floor. MULTI-OUTLET ASSEMBLIES

As indicated on the drawings. Only 15A and 20A branch circuit homeruns may be combined into 11 TELEPHONE/DATA OUTLET BOXES General: Match mounting height of adjacent wiring device listed above.

> Wall-mounted Telephone (Public): One at 48 inches above finished floor and one at 36 inches above finished floor. For other than wiring devices, refer to paragraphs, articles, sections, divisions, or drawings to obtain mounting heights for specific equipment or

WIRING DEVICES

The catalog numbers listed for wiring devices are generally for 20A rated devices. Where 15A rated devices are indicated on the drawings or required for circuit rating limitations, provide wiring devices equivalent to those specified for 20A, but rated for 15A.

Minor changes relative to the location of electrical equipment may be made to comply with structural and building requirements as determined in the course of construction. Provide all wiring devices of the same manufacturer and not mixed on the project, to the maximum extent

possible. Provide color of toggles and receptacles as requested by the

All receptacles located outdoors or in damp or wet locations: Listed as

Weather Resistant', designated by a 'WR' on the faceplate.

Wiring Devices: Unless noted otherwise, devices shall be commercial grade, decorator style, and rated for 20A. Wiring device manufacturers: Cooper, Hubbell, Legrand, or Leviton.]

Automatically Controlled receptacles: Where indicated on drawings, provide device type from other applicable category, along with marking for controlled receptacles as required by the current version of the NEC. In the case where the NEC is not applicable to the project, the device shall still be provided with this marking. In that case, the NEC is providing the standard for the marking and this specification is requiring it to be marked above and beyond the application of the code.

Floor Boxes: UL 514A listed for scrub water exclusion. For slab on grade -Watertight, Class 1, and fully adjustable cast iron box. For slab above grade - Concrete-tight, fully adjustable, stamped galvanized steel box. armor; THHN- or XHHW-insulated conductors; color code: ICEA Method 1, Floor box shape, quantity of gangs, type and quantity of devices, finish, and flange type per drawings. Floor box manufacturers: Hubbell, Legrand, hour through-penetration firestop systems. MC Cable manufacturers: AFC

> Switch Installations in Door/Side Light Frames: Despard type switch, Pass and Seymour ACD201-i or approved equal.

Switch and Pilot Installations: One Despard type switch and one Despard

cover plate. Pass and Seymour ACD201-IV switch and 1475 pilot light, or

type flush 1/25 Watt neon pilot light, both installed in a single-gang box with

Coordinate final devices and coverplates within Floor Boxes and Poke-

unfinished rooms and spaces: Stamped steel, cadmium plated. Install groups of switches under one ganged-plate, usually horizontally; or, where required by details, vertically. Set all cover plates plumb, parallel, and finished flush with the wall.

Provide type-written, adhesive backed label at each receptacle cover plate with the respective "PNLBD-CKT#" designation. Coordinate final labelling requirements with the Owner prior to installation. Where visible to the public, labels shall be adhered to the backside of the coverplate.

14 WEATHERPROOF COVER PLATES

13 SWITCH AND OUTLET COVER PLATES

indicated otherwise on the drawings. Unattended Exterior, Wet Locations or Other Locations as Indicated: Inuse, NEMA 3R, recessed or flush mount, NRTL labeled plates molded from a clear high impact ultraviolet stabilized polycarbonate material for easy verification that cords are plugged in and that the GFCI is functioning.

Back box must be suitable for conduit connecting. Coordinate back box

Cover Plates: By the same manufacturer as the wiring devices; complying

Attended Wet Or Damp Locations: Weatherproof cover plates NRTL listed for wet locations with cover(s) closed; die-cast aluminum or Type 302 stainless steel; single-cover for switches and vertically mounted receptacles; double-cover for horizontally mounted receptacles; selfclosing covers.

with wall depth. Intermatic WP1000C/HC series or equal.

with NFPA 70 ARTICLES 406.9 (A) or (B) requirements for attended or unattended use as applicable.

15 ELECTRICAL SERVICE AND GROUNDING A. ELECTRICAL SERVICE

See drawings for type, size, voltage, phase, and other requirements.

Provide, or arrange with the serving utility for installation to provide, a recording voltmeter at the service point, on the first day the facility is open for business, for a 24-hour voltage test. If voltage and regulation are not within acceptable limits, arrange with the utility for proper voltage. Submit to the Owner a report of maximum and minimum voltage and a copy of the recording voltmeter chart. B. CONNECTION TO SERVING UTILITIES

Provide raceways, terminations, metering provisions, and miscellaneous equipment as required for electrical and telephone services for connection by the serving utility, in strict compliance with the requirements of all applicable codes and of the serving utility involved. Verify all service terminations and connection points in the field and work in conjunction with the utility involved in the installation of all services. Provide all materials and equipment required for complete utility connection but not furnished by the serving utility. Notify the utility companies involved within two weeks after notice to proceed of all required information necessary for the utility to supply the project without delay. Pay all charges of the serving utility for the electrical service(s).

C. GROUNDING

1200A BUS OR SMALLER

Permanently and effectively ground and bond the electrical installation in a thorough and efficient manner, and in conformance, at a minimum, with NFPA 70, or these documents, where they exceed code requirements. Use bare or insulated conductors as specified herein, and other materials indicated on the Drawings.

DISTRIBUTION AND CONTROL EQUIPMENT

Panelboards: Dead-front distribution panelboards with number and sizes of circuit breakers as indicated on the drawings; where installed as service entrance equipment, permanently label as suitable for use as service entrance equipment; fully-rated for the available fault current indicated on the drawings; hinged, lockable front door that covers the circuit breaker handles. Circuit breakers: Quick-make, quick-break, indicating type:

POWER DISTRIBUTION PANELBOARDS: CIRCUIT BREAKER.

breaker controls on the inside face of the door for circuit identification. Manufacturers: Square D Type I-Line, Eaton type Pow-R-Line 4, G.E. types

engraved nameplates for circuit identification of each circuit breaker.

Provide a typewritten card directory indicating exactly what each circuit

CCB or AV-1, or Siemens types P4 or P5. B. LIGHTING AND APPLIANCE PANELBOARDS

Panelboards: Complete with bolt-on thermal magnetic, molded case circuit breakers assembled in a dead-front finished cabinet containing a typewritten card directory indicating exactly what each circuit breaker controls; fully-rated and with the integrated short circuit current ratings indicated on the drawings. Plug-in type breakers will not be acceptable. All two- and three-pole breakers: Common trip type.

Type SWD Circuit Breakers: Use when breaker serves as a switch for 120V or 277V lighting circuits. GFCI Circuit Breakers: Class A ground-fault protection (6-mA trip) for personnel protection. Use as indicated on drawings. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip). Use as indicated on drawings. 4. Handle Clamp: Loose attachment for holding circuit breaker handle in "on" position. Use for all circuits containing emergency lighting loads, fire alarm loads, and as indicated on drawings. Breakers serving fire

alarm loads must have a permanently-affixed red label stating "FA" in white

breaker handle in "on" or "off" position. Use as indicated on drawings. Manufacturers: Square D Type NQOD or NF (as applicable, based on voltage and ampere ratings and required short-circuit interrupting ratings as scheduled on the drawings) or approved equal by Eaton, G.E., or

Provide properly sized lugs for all equipment, circuit breakers, and other

5. Handle padlocking device: fixed attachment for locking circuit

electrical devices to accommodate installed conductors. A larger frame, oversized lugs or non-standard product may be required in some instances. Utilize pin adapters only if necessary and only as allowed by manufacturer and AHJ.

letters adjacent to the circuit breake

DISCONNECT (SAFETY) SWITCHES Disconnect (Safety) Switches: Heavy-duty, fused or non-fused (as indicated on drawings or required) NEMA KS1, externally operated, visibleblade safety switches; NEMA enclosure type indicated on the drawings or suitable for the environment in which installed. based on fusible switch and

fuse sizes indicated, include Class R, J, or L fuse provisions as applicable.

Where indicated, provide fusible switches permanently labeled as suitable

for use as service entrance equipment, with integral and separate neutral

and ground assemblies, suitable for the sizes of conductors indicated. Do

not double-lug any terminations not specifically listed as suitable for more Provide switches where not furnished with the starting equipment, at all other points required by NFPA 70, and where indicated on the drawings.

Manufacturers: Eaton, G.E., Siemens, or Square D.

D. SURGE-PROTECTIVE DEVICES (SPD) Provide SPD labeled in accordance with the latest editions of UL 1283 and 1449, including the highest fault current of Section 37.3 (NRTL Recognized for SPD integral to panelboard) that meets or exceeds the following criteria:

Maximum surge current capability (single pulse rated) per phase: Service entrance switchboards, switchgear: 240kA. Distribution panelboards, panelboards used for service entrance &

MCC: 120kA.

SPD shall have a minimum EMI/RFI filtering of -50dB at 100kHz. Indicators: The SPD shall use LED indicators that provide indication of suppression component failure in all protection modes including N-G, as well as optically isolated N/C dry contacts for remote monitoring.

Transient Counter: A transient voltage surge counter shall be included to

envelope by more than 125V. The readout shall be at least a six digit LCD

located on the unit's hinged front cover. The counter shall be equipped with

totalize transient voltage surges which deviate from the sine wave

Branch Panelboards: 80kA (non-modular is acceptable).

a battery back-up to retain memory when power is not present. A pushbutton switch on the display's face-plate shall be provided for manual Switchboard, Switchgear, Panelboard, and MCC internally mounted SPD:

Factory installed and NRTL labeled by and at the facility of the electrical distribution equipment manufacturer. Externally mounted SPD (only allowed where noted on the construction

comply with all applicable codes. Warranty: The manufacturer shall provide a minimum full five year parts, labor, and travel warranty from date of substantial completion against any part failure, excluding breakers, when installed in compliance with manufacturer's written instructions, NRTL listing requirements, and all applicable national or local electrical codes. Manufacturer shall make av

documents): Install with conductors as short and straight as possible. Twist

the SPD input conductors together to reduce input conductor inductance.

Follow the SPD manufacturer's recommended installation practices and

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MULVANY marin mullians NUMBER **\ PE-2013039892** / 08/06/2021 ANDREA C. MULVANY

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

HOERR SCHAUDT /

BSE STRUCTURAL **ENGINEERS**

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SHEET TITLE

SHEET NUMBER

refer to paragraph "Electronic Drawing Files" for procedures to be used. Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or Field Fabrication: number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. Mark

above mentioned requirements are not met. Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name, and password information needed to galvanizing compound, as applicable). access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor

submittal data, equipment identifications acronym as used on the

drawings, and the Contractor's stamp. The stamp shall certify that the

and specifications, and is coordinated with other trades. Manufacturer

that are being proposed. General product catalog data not specifically

noted to be part of the specified product will be rejected and returned

product literature shall include shop drawings, product data, performance

sheets, samples, and other submittals required by this division. Highlight,

required to purchase the materials and/or equipment in the submittal. The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, sizes of equipment, or quantities, omissions of components or fittings, coordination of electrical requirements, and not coordinating items with actual building conditions and adjacent work. Contractor shall request and secure written acceptance from the Engineer and Architect prior to

shall allow for the Engineer review time as specified above in the

construction schedule. Contractor shall submit only the documents

implementing any deviation. K. ELECTRONIC DRAWING FILES

drawing files will be sent.

and an index of contents.

itself for inclusion in this brochure.

In preparation of shop drawings or record drawings, Contractor may, at his Coordinate sleeve selection and application with selection and application option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive, or direct download, as desired, from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary agreement form and to specify shipping method and drawing format. In addition to payment, the written authorization from the Architect and release agreement form from the Engineer must be received before electronic

accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an

See Division 01 and General Conditions for additional information. OPERATION AND MAINTENANCE INSTRUCTIONS During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, warranties, and descriptive literature as furnished by the equipment

manufacturer. Include an inside cover sheet that lists the project name,

date, Owner, Architect, Engineer, General Contractor, Sub-Contractor,

Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect at the termination of the work. Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment

For electronic manuals, refer to paragraph "Submittals" for requirements. At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of

agreement that the training has been provided.

the equipment provided for this project.

Include Record Drawings as described above.

and/or equipment as it relates to the facility as a whole; operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention; and review of data included in the operation and maintenance manuals Submit a certification letter to the Architect stating that the Owner's

designated representative has been trained as specified herein. Letter

shall include date, time, attendees and subject of training. The Contractor

and the Owner's representative shall sign the certification letter indicating

Schedule training with Owner with at least 7 days advance notice. Test all systems and equipment according to the requirements in NETA WARRANTIES Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a

longer warranty in these construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects occurring within the warranty period(s) as stated in the General Conditions and Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner,

Perform the remedial work promptly, upon written notice from the Engineer Nameplates: Also warrant the following additional items: . All raceways are free from obstructions, holes, crushing, or breaks of anv nature All raceway seals are effective.

The entire electrical system is free from all short circuits and

At the time of Substantial Completion, deliver to the Owner all warranties,

in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

GENERAL MATERIALS AND INSTALLATION

unwanted open circuits and grounds.

B. CONCRETE BASES

and to the satisfaction of the Owner, Architect, and Engineer.

ROUGH-IN Coordinate without delay all roughing-in with other divisions. Conceal all conduit and raceways except in unfinished areas and where otherwise indicated on the drawings.

Provide concrete bases (e.g., housekeeping pads) for equipment where

indicated on the drawings and as specified herein. Concrete bases shall

ASTM C33, and potable water. Exposed exterior concrete shall contain 5

have chamfered edges. Size of base shall be a minimum of 4 inches greater than the footprint of the equipment that it is supporting and shall have a minimum height of 3-1/2 inches. Construct equipment bases of a minimum 28-day, 4000-psi concrete conforming to American Concrete Institute Standard Building Code for Reinforced Concrete (ACI 318) and the latest applicable recommendations of the ACI standard practice manual. Concrete shall be composed of cement conforming to ASTM C 150 Type I, aggregate conforming to

Reduced-wall FMC is not allowed. ANSI C80.6, UL 1242.

> conduits and sleeves, unless noted otherwise. CONDUCTORS AND CABLES Hot-dip Galvanized Rigid Steel Conduit (GRS): ANSI C80.1, UL 6. GENERAL CONDUCTOR AND CABLE REQUIREMENTS Annealed (soft) copper complying with ICEA S-95-658/NEMA WC70 and UL standards 44 or 83 as applicable.

IMC and RMC Fittings: NEMA FB 1; compatible with conduit type and

Rigid Nonmetallic Conduit (RNC): Schedule 40 PVC, 90 deg C rated, All Branch Circuit Wiring: Not smaller than No. 12 AWG. If no conductor NEMA TC-2, UL 651 size is indicated on the Drawings for a branch circuit, provide conductors and conduit sized per NFPA and based on the indicated branch circuit Fittings: NEMA TC 3, TC 6; UL 651, compatible with conduit/tubing type overcurrent protective device (OCPD) rating and number of poles. Where no circuit size (i.e., conductors and OCPD) is indicated on the drawings for a branch circuit, provide three No. 12 AWG conductors, in 3/4-inch

> Control Wiring: Stranded copper conductors, 600V insulation, of the proper type, size, and number as required to accomplish specified function. Minimum size: No. 14 AWG, unless noted otherwise

Flexible Cords and Cables: Stranded copper conductors for all, unless

Special Purpose Conductors And Cables, Such As Low Voltage Control

And Shielded Instrument Wiring: As recommended by the system equipment manufacturer unless indicated otherwise. Copper Conductor Manufacturers: Advance Wire and Cable, AFC Cable, Alan Wire, Alflex, American Insulated Wire, Encore Wire, Northern Cables Okonite, or Southwire.

Connections: Apply a zinc based anti-oxidizing compound to connections.

Do not use terminals on wiring devices to feed through to the next device.

CONDUCTORS AND CABLES INSTALLATION

Install all wiring in approved raceway and enclosures, except where specified or indicated for low-voltage wiring, where specified or indicated for direct-buried cables, or where type MC cable is indicated or specified as

Install all conductors and cables in raceways continuous without taps or

approved solderless connectors, or crimp connectors and terminal blocks

splices. Splice or tap only in approved boxes and enclosures with

for control wiring, and keep to the minimum required. Insulate all splices, taps, and joints as required by codes. All materials used to terminate, splice, or tap conductors: designed for properly sized for, and NRTL listed for the specific application and conductors involved, and installed in strict accordance with the manufacturer's recommendations, using the manufacturer's recommended

cover the box. In general, the direction of branch circuit "home run" routing is indicated on the drawings, complete with circuit numbers and panelboard designation. Continue all such "home run" wiring to the designated panelboard, as

Common or shared neutrals are not allowed unless shown on the drawings to be used or specifically noted to be allowed. Where multi-wire branch circuits (i.e., shared neutral) are allowed, they shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point the branch circuit originates. Multi-pole breakers or 3 single-pole breakers with a handle tie are two examples.

number of conductors exceeds four (conductor count is made up of any

combination of phase and neutral conductors), the following restrictions

apply, which are in addition to those in NFPA 70: Normal or Non-Essential circuits: Maximum of 16 conductors in a single raceway. For up to eight conductors in a raceway, minimum raceway size: 3/4-inch. For greater than eight conductors, minimum raceway size: 1-inch. Do not install any other type of circuit in this raceway.

Minimum wire size for all conductors in this raceway: No. 10

GFCI circuits: Do not use multi-conductor circuits, with a shared neutral, for any GFCI circuit breaker or receptacle circuit. For branch circuits fed from GFCI circuit breakers, limit the one-way

Properly identify all terminal blocks and wire terminals for control wiring

with vinyl stick-on markers or equivalent. Provide Engineer with a list of

in the table below unless there is a color system currently in use by the

are to match the requirements set forth by the AHJ, utility or facility

management. In larger sizes where properly colored insulation is not

facility, utility, or enforced by local amendments, in which case the colors

conductor length to 100 feet between the panelboard and the most remote

one raceway.

receptacle or load on the GFCI circuit.

Phase A: Black

Phase B: Red.

Phase C: Blue.

6 feet in unsupported lengths.

For vertical drops in stud walls.

proposed identifying numbers for review prior to installing markers. Provide an equipment-grounding conductor or bonding jumper, as applicable, in all feeders and branch circuits, sized in accordance with NFPA 70 Tables 250.66 or 250.122, as applicable, unless indicated as larger on the drawings. Wiring shall have insulation of the proper color to match color code system

available, use vinyl plastic electrical tape of the appropriate color around each conductor at all termination points, junctions, and pull boxes. System Voltage:

240V and under, including 208Y/120, 120/240, 120/208 systems:

Neutral: White. Equipment Ground: Green. Isolated Ground: Green with yellow stripe. MC CABLE Metal-clad cable (MC Cable): 600V, unjacketed; UL Standard 83, 1569,

and 1685; NFPA 70 Article 330; aluminum or galvanized steel interlocked

with green insulated grounding conductor; listed for use in UL 1, 2, and 3

Cable Systems, Encore Wire Corporation, Kaf-Tech, or Southwire.

D. APPLICATIONS OF MC CABLE In lieu of flexible conduit and wiring from light fixtures located in accessible ceilings to junction boxes attached to building structure directly above the ceiling. Provide cable whips of sufficient lengths to allow for relocating each

In lieu of EMT, only for 15A and 20A branch circuits (with up to four (4) conductors, not including ground conductor), and only in dry concealed locations above grade, except where specifically not permitted by NFPA 70 owner. AHJ, or noted in list below.

light fixture within a 5 foot radius of its installed location, but not exceeding

Switch and Outlet Plates: Colored, smooth nylon; by the same

manufacturer as the wiring devices, wherever possible. Verify desired materials and colors with Architect before installation. Switch plates in

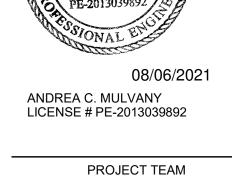
Provide GFCI receptacles for designated weatherproof receptacles, unless

LOT 20 - HUB **BUILDING**

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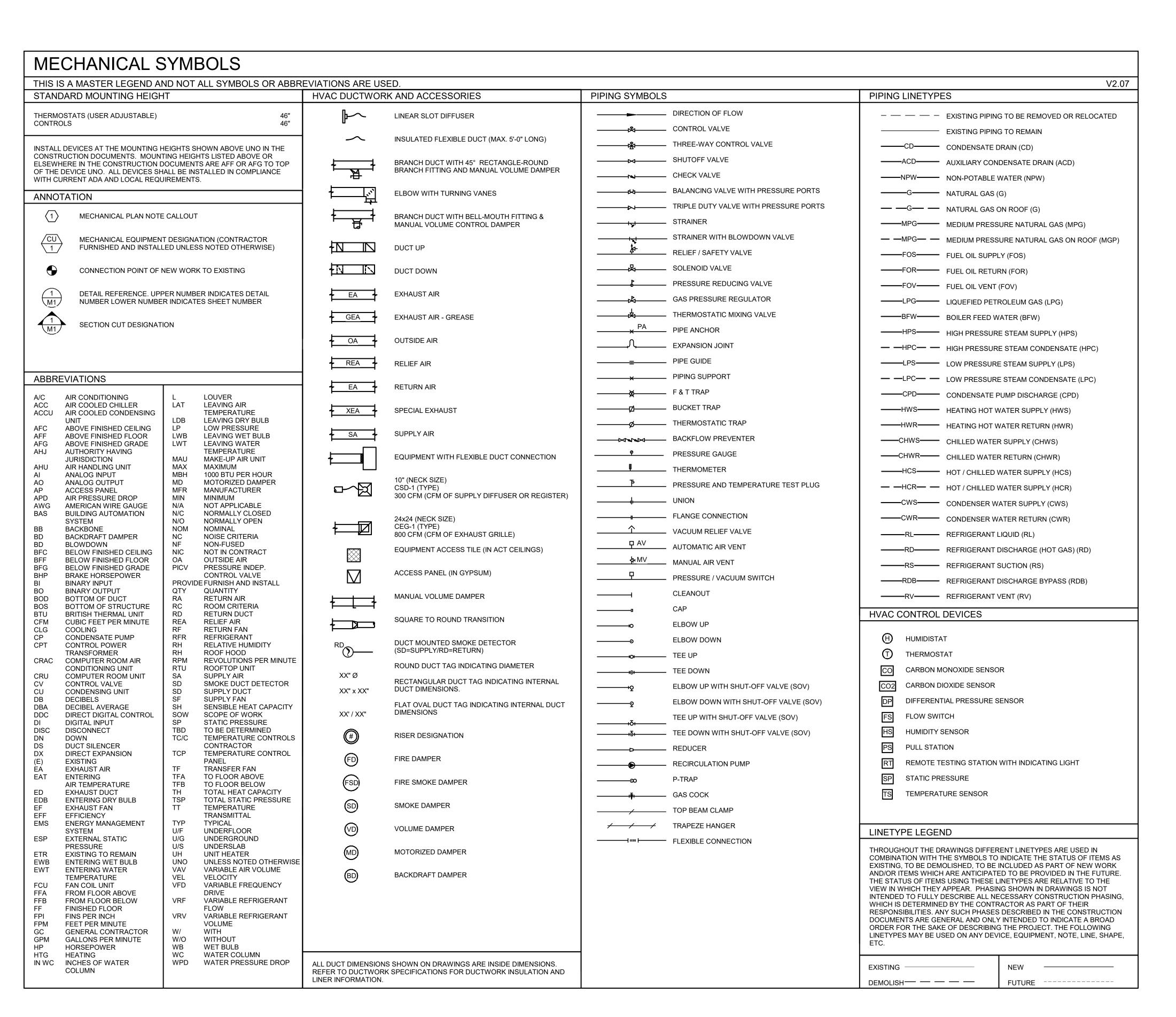
PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON **ENGINEERS**

ELECTRICAL

CONTRACTOR FOGEL ANDERSON HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON

ELECTRICAL



GENERAL NEW NOTES:

- 1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 2. COORDINATE THE INSTALLATION OF THE MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. ANY MODIFICATIONS REQUIRED DUE TO LACK OF COORDINATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
- ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL PLANS SHALL BE PROVIDED BY DIVISION 23 UNLESS OTHERWISE NOTED.
- 4. NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. VERIFY THAT FINAL EQUIPMENT LOCATIONS MEET MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AND PROPER AIRFLOW CLEARANCE AROUND EQUIPMENT.
- 5. REFER TO ARCHITECTURAL DRAWINGS FOR RELATED CONSTRUCTION DETAILS AS APPLICABLE TO THE HVAC SYSTEM. VERIFY CHASES AND PENETRATIONS SHOWN ON ARCHITECTURAL DRAWINGS THAT ARE INTENDED FOR DUCTWORK AND PIPING MEET REQUIREMENTS.
- 6. COORDINATE LOCATION OF ROOF MOUNTED HVAC EQUIPMENT AND ROOF PENETRATIONS WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS.
- 7. INDOOR AIR QUALITY MEASURES: PROTECT INSIDE OF (INSTALLED AND DELIVERED) DUCTWORK AND HVAC UNITS FROM EXPOSURE TO DUST, DIRT, PAINT AND MOISTURE. REPLACE INSULATION THAT HAS BECOME WET AT ANY TIME DURING CONSTRUCTION, DRYING THE INSULATION IS NOT ACCEPTABLE. SEAL ANY TEARS OR JOINTS OF INTERNAL FIBERGLASS INSULATION. REMOVE DEBRIS FROM CEILING/RETURN AIR PLENUM INCLUDING DUST. AN INDEPENDENT, PROFESSIONAL DUCT CLEANING COMPANY SHALL VACUUM CLEAN ANY DUCTWORK CONNECTED TO HVAC UNITS THAT WERE OPERATED DURING THE CONSTRUCTION PERIOD AFTER NEW FILTERS ARE INSTALLED AND PRIOR TO TURNING SYSTEM OVER TO THE OWNER. THE INTERNAL SURFACES AND ASSOCIATED COILS OF ANY HVAC UNITS THAT WERE OPERATED SHALL ALSO BE CLEANED.
- 8. INSTALL DUCTWORK AND PIPING PARALLEL TO BUILDING COLUMN LINES UNLESS OTHERWISE SHOWN OR NOTED.
- 9. OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT ATTACH HANGERS AND SUPPORTS TO THE ABOVE FLOOR SLAB OR ROOF EXCEPT WHERE CONCRETE INSERTS IN CONCRETE SLABS ARE ALLOWED BY THE SPECIFICATIONS.
- 10. COORDINATE LOCATION OF EQUIPMENT SUPPORTS WITH LOCATION OF EQUIPMENT ACCESS PANELS/DOORS TO ENABLE SERVICE OF EQUIPMENT AND/OR FILTER REPLACEMENT.

- 11. SEAL PENETRATIONS THROUGH THE BUILDING COMPONENTS IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. FIREPROOF PENETRATIONS THROUGH FIRE RATED COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.
- COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.

 12. COORDINATE THE EXACT MOUNTING SIZE AND FRAME TYPE OF DIFFUSERS, REGISTERS AND GRILLES WITH THE SUPPLIER TO

MEET THE CEILING, WALL AND DUCT INSTALLATION

- REQUIREMENTS.

 13. ADJUST LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES AS REQUIRED TO ACCOMMODATE FINAL CEILING GRID AND LIGHTING LOCATIONS.
- 14. PAINT PORTIONS OF DUCTWORK AND INSULATION THAT ARE EXPOSED TO VIEW BY THE INSTALLATION OF DIFFUSERS, REGISTERS, AND GRILLES IN CEILINGS OR WALLS FLAT BLACK. PORTIONS INCLUDE BOTH THE INTERIOR OF UNLINED DUCTWORK AND THE EXTERIOR OF DUCTWORK AND INSULATION.
- 15. LOCATE AND SET THERMOSTATS AND HUMIDISTATS AT LOCATIONS SHOWN ON PLANS. VERIFY EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. INSTALL DEVICES WITH TOP OF DEVICE AT MAXIMUM 48" AFF TO MEET ADA REQUIREMENTS UNLESS NOTED OTHERWISE ON PLANS. PROVIDE INSULATED BACKING FOR THERMOSTATS MOUNTED ON EXTERIOR BUILDING WALLS. INSTALL WIRING IN CONDUIT PROVIDED BY DIVISION 26. AT A MINIMUM, PROVIDE CONDUIT IN THE WALL FROM THE JUNCTION BOX TO 6" ABOVE THE CEILING
- 16. COORDINATE THE LOCATION AND ELEVATION OF WALL-MOUNTED DEVICES WITH PRESENTATION BOARDS, DISPLAY CABINETS, SHELVES OR OTHER COMPONENTS SHOWN ON THE ARCHITECTURAL DRAWINGS THAT ARE TO BE INSTALLED UNDER OTHER DIVISIONS. CONTRACTOR WILL NOT BE REIMBURSED FOR RELOCATION OF WALL-MOUNTED DEVICES CAUSED BY A LACK OF COORDINATION.
- 17. PROVIDE A MANUAL BALANCING DAMPER IN EACH DUCT TAKEOFF FROM SUPPLY, RETURN, OUTDOOR AND EXHAUST
- 18. PROVIDE A PREFABRICATED 45 DEGREE, HIGH EFFICIENCY, RECTANGULAR/ROUND BRANCH DUCT TAKEOFF FITTING FOR BRANCH DUCT CONNECTIONS AND TAKE-OFFS TO INDIVIDUAL DIFFUSERS, REGISTERS AND GRILLES. PROVIDE WITH INTEGRAL MANUAL BALANCING DAMPER AND LOCKING QUADRANT WHERE INDICATED ON PLANS.
- 19. BRANCH DUCTWORK TO AIR OUTLETS SHALL BE SAME SIZE AS OUTLET NECK SIZE UNLESS OTHERWISE NOTED.
- 20. REFER TO SPECIFICATIONS FOR DUCTWORK AND PIPING INSULATION REQUIREMENTS. DUCT SIZES ON MECHANICAL PLANS INDICATE CLEAR INSIDE AIRFLOW DIMENSIONS, INCREASE SHEET METAL SIZES ACCORDINGLY TO ACCOUNT FOR THICKNESS OF DUCT LINER.
- 21. FLEXIBLE DUCTWORK SHALL NOT EXCEED 5'-0" IN LENGTH AND SHALL BE INSTALLED AND SUPPORTED TO AVOID SHARP BENDS AND SAGGING. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- 22. RIGIDLY SUSPEND UNIT HEATER FROM STRUCTURE WITH SUPPORTING ANGLES AND ALL-THREAD HANGING RODS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.23. PROVIDE A NEW SET OF AIR FILTERS IN UNITS PRIOR TO
- TESTING, ADJUSTING AND BALANCING AND BEFORE TURNING SYSTEM(S) OVER TO OWNER.



LOT 20 - HUB BUILDING

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3151 NW PARAGON PKWY

Project No.: 19050.02

Date: 08/06/2021

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No. Date Description

REGISTRATION



08/06/2 BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / LAND3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

BSE STRUCTURAL

ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

STRUCTURAL

ELECTRICAL HENDERSON ENGINEERS
FIRE PROTECTION HENDERSON

CONTRACTOR FOGEL ANDERSON

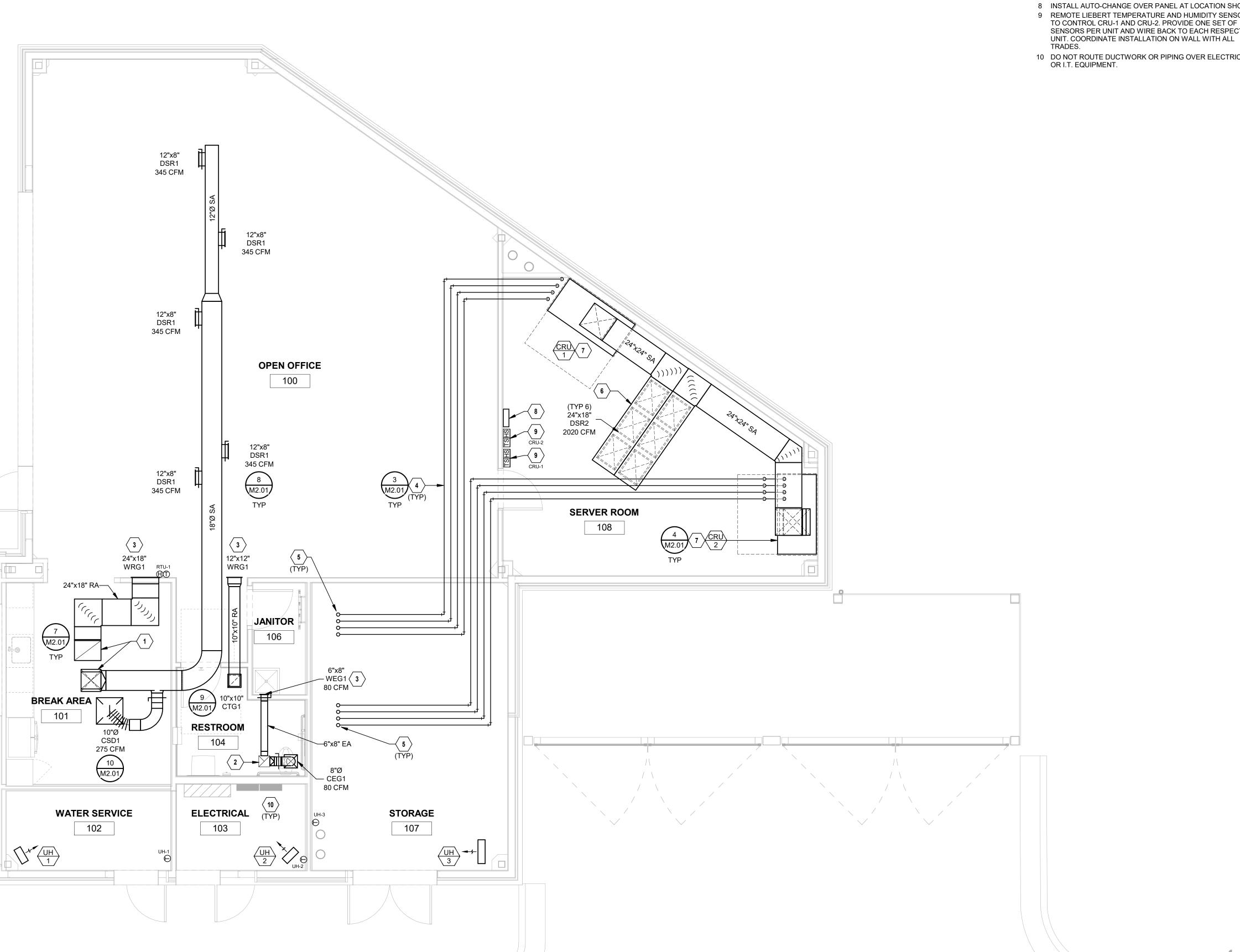
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EXPIRES 12/31/2021

MECHANICAL GENERAL NOTES AND LEGEND



MECHANICAL PLAN
1/4" = 1'-0"

MECHANICAL PLAN NOTES:

- 1 20"X18" SUPPLY AIR DUCT AND 24"X18" RETURN AIR DUCT UP THROUGH ROOF TO RTU-1. PROVIDE TRANSITIONS AS REQUIRED TO MATCH THE UNIT CONNECTION SIZES.
- 2 10"X10" EXHAUST DUCT UP THROUGH ROOF TO EF-1. PROVIDE TRANSITION AS REQUIRED TO MATCH FAN CONNECTION SIZE.
- 3 MOUNT GRILLE TIGHT TO THE BOTTOM OF STRUCTURE. COORDINATE EXACT LOCATION AND FINISH COLOR WITH ARCHITECT.
- 4 ROUTE REFRIGERANT PIPING BETWEEN THE ROOF-MOUNTED CONDENSING UNIT AND THE INDOOR UNIT. SIZE AND ROUTE PIPING PER THE MANUFACTURER'S REQUIREMENTS. COORDINATE WITH CABLE TRAYS,
- DUCTWORK, AND ALL OTHER DISCIPLINES. 5 REFRIGERANT PIPING UP THROUGH THE ROOF. SIZE AND INSTALL PER THE MANUFACTURER'S REQUIREMENTS.
- 6 PROVIDE SUPPLY AIR IN-BETWEEN THE RACKS IN THE SERVER ROOM. ROUTE DUCTWORK TIGHT TO THE BOTTOM
- OF STRUCTURE. COORDINATE ROUTING WITH CABLE TRAYS AND ALL OTHER DISCIPLINES. 7 MAINTAIN THE MANUFACTURER'S REQUIRED CLEARANCE IN
- FRONT OF THE UNIT TO ENSURE ADEQUATE RETURN AIR
- 8 INSTALL AUTO-CHANGE OVER PANEL AT LOCATION SHOWN. 9 REMOTE LIEBERT TEMPERATURE AND HUMIDITY SENSORS TO CONTROL CRU-1 AND CRU-2. PROVIDE ONE SET OF SENSORS PER UNIT AND WIRE BACK TO EACH RESPECTIVE
- 10 DO NOT ROUTE DUCTWORK OR PIPING OVER ELECTRICAL

LOT 20 - HUB BUILDING

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REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CIVIL

LANDSCAPE HOERR SCHAUDT /

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

HENDERSON

STRUCTURAL BSE STRUCTURAL **ENGINEERS**

ENGINEERS MECHANICAL HENDERSON

PLUMBING

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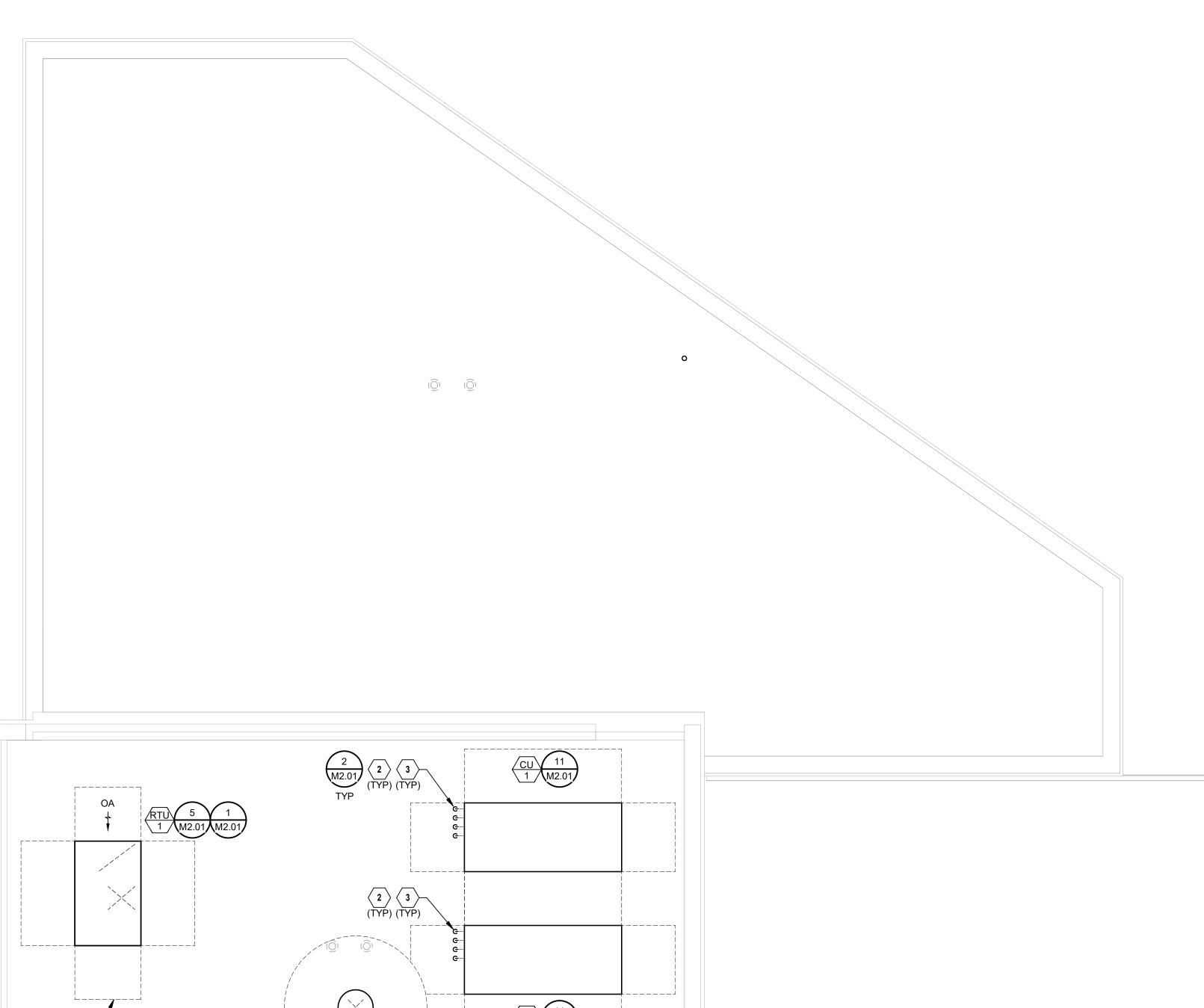
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MECHANICAL PLAN



- PROVIDE ROOF-MOUNTED EXHAUST FAN. MAINTAIN A
 MINIMUM OF 10'-0" SEPARATION FROM ALL OUTSIDE AIR

 NETALES.
- 2 ROUTE REFRIGERANT PIPING BETWEEN THE ROOF-MOUNTED CONDENSING UNIT AND THE INDOOR UNIT. SIZE AND ROUTE PIPING PER THE MANUFACTURER'S REQUIREMENTS. COORDINATE WITH CABLE TRAYS, DUCTWORK, AND ALL OTHER DISCIPLINES.
- REFRIGERANT PIPING DOWN THROUGH THE ROOF.
 DASHED LINES REPRESENT MANUFACTURER REQUIRED CLEARANCES.



MECHANICAL ROOF PLAN
1/4" = 1'-0"



LOT 20 - HUB BUILDING

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PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / LAND3

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MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON

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CONTRACTOR FOGEL ANDERSON

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1850004412 EXPIRES 12/31/2021

SHEET TITLE

MECHANICAL ROOF PLAN

SHEET NUMBER

M1.02

1. PROVIDE OPENING THROUGH ROOF AND ROOF DECK INSULATION NO LARGER THAN REQUIRED TO ALLOW DUCTS TO PASS THROUGH. REFER TO PLANS FOR DUCT SIZES. TRANSITION AS REQUIRED IN ROOF CURB TO RTU SUPPLY AND

RETURN OPENINGS. 2. PROVIDE SLOPED ROOF CURB TO INSTALL ROOFTOP UNIT LEVEL TO ENSURE PROPER DRAINAGE. COORDINATE ROOF SLOPE WITH ARCHITECTURAL. FLASH AND COUNTER FLASH ROOF PENETRATIONS, ETC. TO ENSURE WEATHER TIGHT INSTALLATION.

SEALING MATERIAL SHEET METAL FLASHING RECEIVER WOOD NAILER - OMIT WHERE WOOD NOT ALLOWED BY LOCAL BUILDING CODE ROOFTOP UNIT HIGH-DOMED, CAPPED, GASKETED FASTENERS (APPROX. 18" O.C. AND MINIMUM TWO FASTENERS PER SIDE) ROOFTOP UNIT BASE RAIL SECURE UNIT TO CURB SHEET METAL COUNTERFLASHING ROOF CURB INSULATION EXTENSION OF ROOF MEMBRANE DUCT ABOVE HEAD OF CANT (NOT SHOWN FOR CLARITY) PROVIDE FLASHING AT ROOF CURB BASE ROOF MEMBRANE CURB INSULATION __ STRUCTURE SECURE CURB TO STRUCTURE CAULK - FILL ENTIRE CURB FOOTPRINT, STARTING AT THE OPENING ROOF DECK, WITH 2" MINERAL WOOL OR SEMI-AROUND DUCT -RIGID FIBERGLASS INSULATION, 2 LAYERS OF 5/8" SHEETROCK, 2" INSULATION, 2 LAYERS OF 5/8"

1. CUT METAL DECKING TO ALLOW CURB INSTALLATION ON STEEL FRAMING. AFTER CURB IS SET IN PLACE, TRIM REMAINING METAL DECKING AND INSTALL WITHIN CURB, TACK WELD DECKING TO SUPPORT STEEL. DO NOT WELD INTERIOR DECKING TO ROOF CURB. PROVIDE ADDITIONAL CROSS FRAMING TO SUPPORT INTERIOR DECKING AND FILL MATERIAL AS REQUIRED. 2. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR ROOF CURBS,

SHEETROCK, AND 2" INSULATION.

ANCHORING AND SEISMIC/WIND RESISTANCE.

5 ROOF CURB DETAIL NTS

6 ROOF MOUNTED DOWNBLAST FAN DETAIL NTS

PROVIDE

EXPOSED TO

SEAL OPENING

WEATHERTIGHT

MAINTAIN ROOF

WARRANTY

ROOF DECK

EXHAUST FAN -

PROVIDE VIBRATION

CURB AND BASE

ISOLATORS BETWEEN

SECURE BASE TO CURB

CONNECT TO FAN CURB.

OVER TOP OF CURB AND

SECURE TO WOOD NAILER -

TRANSITION DUCT TO

EXTEND DUCTWORK

ARCHITECTURAL DWGS -

MORE INFORMATION.

RIGID DUCT WITH

CEILING GRILLE

AS SCHEDULED

INTERIOR

WALL ONLY

1" MIN LINER -

CEILING GRILLE

AS SCHEDULED -

9 RETURN/TRANSFER AIR DUCT DETAIL NTS

NOTES:

RIGID DUCT WITH

1" MIN LINER

ROOF DECK AND

INSULATION PER

44

2 PIPE ROOF PENETRATION ENCLOSURE DETAIL NTS

1. FOR MULTIPLE PIPES, PROVIDE ONE ENCLOSURE, WHERE FEASIBLE.

PROVIDE FLASHING

BETWEEN CURB AND

ROOF IN A MANNER TO

WEATHER

ALUMINUM JACKET OVER INSULATION

TO ENSURE FAN IS INSTALLED LEVEL.

ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS AND MEET LOCAL CODE.
 IF DAMPER IS SPECIFIED IN EQUIPMENT SCHEDULE, INSTALL DAMPER AT BASE OF CURB AND

3. PREFABRICATED INSULATED ROOF CURB WITH TREATED WOOD NAILER, CANT, AND STEP AS

METHOD CONSISTENT WITH ROOF CONSTRUCTION. ROOF CURB SHALL BEAR ON ROOF

REQUIRED TO ACCOMMODATE ROOF INSULATION. FRAME AND SECURE CURB TO ROOF WITH

STRUCTURE. REFER TO ARCHITECTURAL DRAWINGS AND CURB MANUFACTURER'S DETAILS FOR

SECURE FROM ABOVE TO ALLOW SERVICE THROUGH TOP OF CURB.

4. FOR SLOPED ROOFS, PROVIDE CURB WITH DIMENSIONS CAPABLE OF COMPENSATING ROOF SLOPE

RIGID DUCT WITH 1"

PLANE OF

PARTITION OR WALL

RIGID DUCT

WITH 1" MIN

LINER -

PARTITION

OR WALL -

MIN LINER PER

SPECIFICATIONS

HIGH WIND STRAPPING: PROVIDE STAINLESS STEEL STRAPS OF LENGTH, WIDTH, THICKNESS, AND SPACING SUFFICIENT TO SECURE FAN TO CURB TO WITHSTAND WIND SPEED REQUIREMENTS PER LOCAL CODE. WRAP STRAPS OVER FAN AND SECURELY ATTACH TO OPPOSITE SIDE OF THE CURB.

- SUPPORT DUCT

MINIMUM

1.5D

L-SHAPED AIR DUCT PLAN VIEW

MINIMUM

U-SHAPED AIR DUCT SECTION

FROM STRUCTURE

SUPPORT

OF WALL

REFER TO PLANS

FOR DUCT SIZE

CEILING

DUCT FROM

STRUCTURE

ON EACH SIDE

— SEE NOTES 3 AND 4

- SECURE CURB TO ROOF

ROOF CONSTRUCTION

- SEE NOTE 2

WITH METHOD

CONSISTENT WITH

26 GA. GALVANIZED

COVER, SLOPE TO

CAULK ALL AROUND

- 1" RIGID INSULATION

ROOFING

INSULATION

PREFABRICATED

INSULATED CURB

WITH TREATED

WOOD NAILER

DRAIN

ROOF OPENING

SUPPORT DUCT

MINIMUM 1.5D

MINIMUM

CEILING TO CEILING SECTION

1.5D

CEILING RETURN GRILLE BOOT

FROM STRUCTURE

- SUPPORT DUCT

FROM STRUCTURE

ON EACH SIDE OF

CEILING

1. REFER TO FLOOR PLAN FOR OUTLET DEPTH. WHEN NO DEPTH IS SHOWN, MINIMUM DEPTH SHALL

BE AS REQUIRED TO LIMIT AIR VELOCITY TO 500 FPM WITH A MINIMUM SIZE OF 0.5D.

. USE THREADED ROD FOR RECTANGULAR DUCTS LARGER THAN 60" WIDE. OMIT SHEET METAL SCREWS IF HANGER STRAP IS CONTINUOUS AND LOOPS UNDER ENTIRE

(MAX. 36"∅)

→ SECURE ROD TO

STRUCTURE IN AN APPROVED MANNER

→ STEEL TURNBUCKLE

REFER TO SPECIFICATIONS

FOR REQUIREMENTS AND APPLICATION OF PIPE

INSULATION, VAPOR BARRIER

PIPE SADDLE, HIGH DENSITY

INSULATION INSERT, AND

RECTANGULAR DUCT

─ ANGLE IRON OR UNISTRUT

└─ SIZE BOLTS FOR LOAD

THREADED

ROD (TYP)

THREADED

SHEET METAL

ROD (TYP)

BAND

(ANY SIZE)

└ CHANNEL SUPPORT

PIPE STOP (TYP)

7 DUCT HANGER LOWER ATTACHMENT DETAILS NTS

(MAX. 24"∅) (MAX. 36"∅)

ROLLER CHAIR SUPPORT (TYP)

THREADED STEEL ROD WITH NUT

AND WASHER BOTH SIDES (TYP.)

3 MULTIPLE PIPE TRAPEZE HANGER DETAIL NTS

HANGER

STRAP (TYP)

SHEET METAL

SCREWS. SEE

NOTE 2.

TWIST STRAP

LOAD RATED

FASTENER (TYP) -

BAND OF SAME

SIZE AS HANGER

STRAP (TYP) -

DUCT (TYP)

ROUND

WHEN NECESSARY -

FOR ROUND DUCTS LARGER THAN 36"Ø. USE TWO HANGER RODS TO SUPPORT DUCT FROM EACH SIDE.
 HANGERS MUST NOT DEFORM DUCT SHAPE.

EXTERNALLY INSULATED TAKEOFF WITH VOLUME DAMPER AND DAMPER

METALLIC OR NON-METALLIC

BAND OVER INSULATION (TYPICAL)

(d)

1. FLEXIBLE DUCT LENGTH MAY NOT EXCEED 5'-0". EXTEND RIGID DUCT AS REQUIRED. 2. REFER TO SPECIFICATIONS FOR FLEXIBLE DUCTWORK INSTALLATION REQUIREMENTS.

FOIL TAPE AT INSULATION JOINT

PROVIDE RIGID 90° ELBOW WHERE

REQUIRED TO KEEP

WITHIN 5'-0" LENGTH

FLEXIBLE DUCT

PRE-INSULATED

PERMANENTLY

SEALED AND SUPPORTED TO

SHARP TURNS METALLIC OR

NON-METALLIC

BAND (TYPICAL)

FLEXIBLE DUCT AS

REQUIRED, INSTALL

PREVENT KINKING AND

CEILING DIFFUSER

AS SCHEDULED

LIMITATION.

LOCK WITH EXTENSION

8 REGISTER MOUNTING TO ROUND DUCT DETAIL NTS

6" MINIMUM -

SIDE VIEW

SADDLE TYPE DUCT

WITH NEOPRENE GASKET

INVERTED DUCT TODUCT COLLAR. REFER TO DRAWINGS FOR NECK SIZE. ROUND SUPPLY DUCT -OVERSIZE DUCT COLLAR TO FIT REGISTER FLANGE. REFER TO DWG.'S FOR REGISTER NECK SIZE. **END VIEW** SADDLE TYPE DUCT WITH NEOPRENE GASKET (TYPICAL)

EQUIPMENT

CLEARANCE

REBAR OR

POUR SLAB FLAT WITH NO VALLEYS.
 MINIMUM CLEARANCE AROUND EQUIPMENT, ALL SIDES, PER MANUFACTURER.

3-1/2" WHEN NOT OTHERWISE SPECIFIED.

DIMENSIONS SHOWN ARE MINIMUM ACCEPTABLE; REVISE AS REQUIRED FOR EQUIPMENT BEING

4. COORDINATE PAD HEIGHT WITH SPECIFICATIONS. WHEN APPLICABLE, COORDINATE PAD HEIGHT

WITH CONDENSATE DRAIN TRAP DEPTH +1" CLEARANCE. ABSOLUTE MINIMUM PAD HEIGHT IS

WIRE MESH

SEE NOTE 2

ROUND SUPPLY DUCT

ANCHOR EQUIPMENT

BASE PLATE TO CURB

EQUIPMENT SUPPORT LEG

WITH LAG SCREWS

PROVIDE VIBRATION

COUNTER FLASHING

ROOFING

ROOF EQUIPMENT SUPPORT RAIL DETAIL NTS

1. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS FOR EQUIPMENT

SUPPORTS, ANCHORING AND SEISMIC/WIND RESISTANCE.

BASE PLATE OF

ISOLATION PER

SPECIFICATIONS

EQUIPMENT SUPPORT LEG

CAP FLASHING

NEOPRENE WASHER

BASE FLASHING

- ROOF STRUCTURE,

SEE ARCHITECTURAL

ROOF INSULATION

(OR RAIL)

SUPPLY GRILLE OR

DIFFUSER SECURED

LANDSCAPE HOERR SCHAUDT / FOUNDATIONS BSE STRUCTURAL

BRADLEY E. CHAMBON

PROJECT TEAM

GBA

FINKLE+WILLIAMS

ARCHITECTURE

LICENSE # 028603

ARCHITECT

CIVIL

ENGINEERS STRUCTURAL BSE STRUCTURAL

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BUILDING

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08/06/2021

REVISIONS

REGISTRATION

Project No.: 19050.02

Issued For: PERMIT SET

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EXPIRES 12/31/2021

MECHANICAL DETAILS

SHEET TITLE

CONTROL FEATURE	UNITS	RTU-1	POINT TYPE	NOTES
		SETPOINT	INTERFACE WITH	
		OR Y/N	DDC (READ/WRITE)	
UILDING AUTOMATION SYSTEM (BAS)				
BAS MONITORING AND MANAGEMENT INTERFACE (FOR FUTURE USE)		Y	BACNET	Α
ETPOINTS	,			
COOLING - OCCUPIED SETPOINT	°F	75	READ/WRITE	
COOLING - UNOCCUPIED SETPOINT	°F	80	READ/WRITE	
DEAD BAND - MINIMUM HEATING AND COOLING TEMPERATURE SETPOINT DIFFERENCE	°F	5		
HEATING - OCCUPIED SETPOINT	°F	70	READ/WRITE	
HEATING - UNOCCUPIED SETPOINT	°F	60	READ/WRITE	
DEHUMIDIFICATION SETPOINT - HUMIDITY SENSOR FEEDBACK	% RH	60%	READ/WRITE	В
ROGRAMMED CONTROL FEATURES				
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - PROGRAMMABLE THERMOSTAT		Y	READ	В
QUIPMENT ACCESSORIES AND CONTROL MODULES				
OUTSIDE AIR DAMPER - MOTOR OPERATED (MODULATING)		Υ	READ POSITION	L
INTEGRATED ECONOMIZER - ENTHALPY ENABLE	BTU/LB	26	READ/WRITE	E
ECONOMIZER FAULT DETECTION AND DIAGNOSTICS (FDD) SYSTEM		Y	READ	F, G
RELIEF - BAROMETRIC DAMPER		Y		
COOLING COIL (DX - STAGED)		Y	READ STATUS	М
DEHUMIDIFICATION - HOT GAS REHEAT		Y	READ STATUS	0
HEATING COIL (ELECTRIC)		Y	READ STATUS	М
UPPLY FAN CONTROL METHODS				
ON DURING OCCUPIED HOURS		Y		
CYCLE WITH LOADS DURING OCCUPIED HOURS		N		
VARIABLE VOLUME - STAGED FAN CONTROL IN RESPONSE TO ACTIVE COOLING COIL STAGES		Y	READ STATUS	M, Q

DIV. 23 CONTRACTOR SHALL PROVIDE CONTROL PANEL(S), WIRING, THERMOSTAT(S), TEMPERATURE SENSOR(S), HUMIDISTAT(S), AND/OR CO2 SENSOR(S) WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED TO FACILITATE THE SCHEDULED CONTROL MODULES AND SEQUENCES OF OPERATION. EACH UNIT SHALL CONTROL BASED ON ITS OWN INTERNAL SAFETIES, TIME DELAYS, AND SEQUENCES UNLESS NOTED OTHERWISE. COORDINATE WITH OWNER FINAL BUILDING AND EQUIPMENT SCHEDULES DURING STARTUP. REFERENCE DIVISION SPECIFICATIONS FOR INDIVIDUAL DEVICE REQUIREMENTS.

- PROVIDE UNIT WITH FACTORY MOUNTED DDC CONTROLS AND INTEGRATE INTO THE BAS. BAS SHALL PROVIDE REMOTE SETPOINT ADJUSTMENT, SCHEDULING, AND MONITORING OF THE POINTS LISTED IN THE SCHEDULE FOR
- EACH UNIT. DIVISION 23 CONTRACTOR SHALL PROVIDE DEVICE.

RETURN AIR SMOKE DETECTOR - SAFETY SHUTDOWN

- IF SETPOINT VALUE IS LISTED, IT INDICATES ECONOMIZER HIGH-LIMIT SHUTOFF. UNIT SHALL BE IN ECONOMIZER IF CONDITIONS ARE LESS THAN SETPOINT. THE FOLLOWING SENSORS SHALL DETERMINE ECONOMIZER ON POINT.
- OUTSIDE AIR HUMIDITY; DIVISION 23 PROVIDED AS PART OF ECONOMIZER CONTROL MODULE. DEVICE SHALL BE FACTORY MOUNTED AND PRE-WIRED FOR OPERATION SUBJECT TO THE ONBOARD CONTROLLER. PROVIDE UNIT WITH AN FDD SYSTEM CONSISTING OF PERMANENTLY INSTALLED OUTSIDE AIR, SUPPLY AIR, AND RETURN AIR TEMPERATURE SENSORS. THE UNIT CONTROLLER SHALL AT A MINIMUM BE CAPABLE OF PROVIDING SYSTEM STATUS OF ECONOMIZER, COMPRESSOR, HEATING, MIXED AIR LOW LIMIT ALARM, AND SENSOR VALUES.
- EACH OPERATING MODE SHALL BE CAPABLE OF INDEPENDENTLY OPERATING FOR TESTING. THE SYSTEM SHALL REPORT FAULTS TO AN APPLICATION ACCESSIBLE BY SERVICE PERSONNEL. THE FOLLOWING FAULTS SHALL BE DETECTED: AIR TEMPERATURE SENSOR FAILURE, ECONOMIZER ENABLED/DISABLED WHEN ECONOMIZER SHOULD BE OFF/ON, RESPECTIVELY, DAMPER NOT MODULATING, AND EXCESS OUTSIDE AIR.
- EQUIPMENT MANUFACTURER SHALL PROVIDE MODULATING DAMPER AND CONTROLS CAPABLE OF ADJUSTING THE DAMPER POSITION TO MAINTAIN THE SCHEDULED OUTSIDE AIR ON THE DRAWINGS ACROSS ALL FAN SPEEDS. DIV. 23 CONTRACTOR SHALL PROGRAM MULTIPLE DAMPER POSITION SETPOINTS IN THE FIELD DURING TESTING AND BALANCING TO MAINTAIN MINIMUM VENTILATION WHEN NOT IN ECONOMIZER. DAMPER SHALL BE CLOSED DURING
- UNOCCUPIED HOURS. UNITARY CONTROLLER SHALL MODULATE AND/OR CYCLE SUPPLY FAN SPEED SETTING AND COIL CAPACITY STAGES

SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.

PROVIDE STAGED FAN CONTROL WITH MINIMUM 2 FAN SPEEDS. LOW SPEED SHALL NOT EXCEED 66% OF FULL SPEED AND SHALL DRAW NO MORE THAN 40% OF FAN POWER AT FULL SPEED. DIVISION 28 CONTRACTOR SHALL PROVIDE DEVICE.

ROOFTOP UNIT SCHEDULE	(DX COOLING, ELECTRIC HEATING)
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														\			•	·						/					
					SUPPL	_Y FAN	l					COC	DLING COI	_					HE	ATING C	OIL		MIN.		El	ECTRIC	AL		
			NOMINAL		ESP	NOM	VFD	TH	SH	EA	١T	L/	AT		MIN EFF	MIN NO		MIN OUT	NOM	EAT	LAT	MIN NO	O/A					WEIGHT	
MAF	K MANUFACTURER	MODEL	TONS	CFM	(IN)	HP	(Y/N)	(MBH)	(MBH)	(°F DB)	(°F WB)	(°F DB)	(°F WB)	TYPE	(EER)	STAGES	(FPM)	(MBH)	(KW)	(°F DB)	(°F DB)	STAGES	CFM	V/PH	MCA	MOCP	DISC TYPE	(LBS)	NOTES
RTU	1 TRANE	TSC060	5	2000	8.0	1.00	No	60.0	44.5	75.8	62.6	54.8	52.0	R410A	12	1	550	61.4	18.0	61.7	90.0	2	315	208/3	57	60	NON-FUSED	930	A-P

MODEL NUMBERS AND NOMINAL TONS LISTED SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER, MODEL NUMBERS, OR NOMINAL TONS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

- A. REFER TO ROOFTOP UNIT CONTROL MATRIX FOR CONTROL FEATURES, MODULES, AND ACCESSORIES THAT SHALL BE PROVIDED WITH THE EQUIPMENT.
- EQUIPMENT SIZED FOR 105 °F AMBIENT TEMPERATURE.
- PROVIDE 4" MERV 13 EFFICIENT PLEATED THROWAWAY AIR FILTERS. PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT. STARTERS FOR ALL MOTORS SHALL BE FURNISHED INTEGRAL WITH UNIT.
- PROVIDE FACTORY 2-SPEED MOTOR TO FACILITATE STAGED FAN SPEED CONTROL. COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
- PROVIDE 125 VAC, 20 AMP DUPLEX CONVENIENCE RECEPTACLE MOUNTED TO UNIT READY FOR FIELD WIRING WITH A COVER UL LISTED FOR WET AND DAMPER LOCATIONS WHEN IN USE. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT.
- PROVIDE INSULATED ROOF CURB WITH MINIMUM HEIGHT REQUIRED TO MAINTAIN BOTTOM OF EQUIPMENT A MINIMUM OF 16 INCHES ABOVE FINISHED ROOF SURFACE. PROVIDE SLOPED CURB IF NEEDED TO MATCH ROOF SLOPE. COORDINATE WITH ROOF INSULATION THICKNESS AND ROOF TAPER AT INSTALLED LOCATION. COORDINATE CURB TYPE WITH DRAWINGS. SCHEDULED WEIGHT IS THE MAXIMUM ALLOWABLE OPERATING WEIGHT OF THE EQUIPMENT AND CURB.
- COOLING COIL LAT IS LEAVING AIR TEMPERATURE OF COIL.

CONTRACTOR IF DIFFERENT FROM THAT SCHEDULED.

PROVIDE GUARDS TO PROTECT CONDENSER COIL FROM HAIL OR OTHER DAMAGE. PROVIDE HEATER TO MEET OR EXCEED SCHEDULED MINIMUM MBH OUTPUT. NOMINAL KW IS BASED ON LISTED MANUFACTURER'S STANDARD PRODUCT. COORDINATE EQUIPMENT POWER SUPPLY WITH ELECTRICAL

					FAN	SC	HE	DU	LE					
											ELECTRICAL	-		
	SERVICE					ESP	NOM	FAN	DRIVE			STARTER	WEIGHT	
MARK	DESCRIPTION	MANUFACTURER	MODEL	MOUNTING	CFM	(IN)	HP	RPM	(BELT/DIRECT)	V/PH	DISC TYPE	TYPE	(LBS)	NOTES
EF 1	EXHAUST	GREENHECK	G-070-VG	ROOF	160	0.4	0.07	1489	DIRECT	115/1	NON-FUSED	FVNR	30	A-D

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- A. PROVIDE INSULATED ROOF CURB WITH MINIMUM HEIGHT REQUIRED TO MAINTAIN BOTTOM OF EQUIPMENT A MINIMUM OF 8 INCHES ABOVE FINISHED ROOF SURFACE. PROVIDE SLOPED CURB IF NEEDED TO MATCH ROOF SLOPE. COORDINATE WITH ROOF INSULATION THICKNESS AND ROOF TAPER AT INSTALLED
- LOCATION. COORDINATE CURB TYPE WITH DRAWINGS. PROVIDE BIRDSCREEN AND GRAVITY BACKDRAFT DAMPER.
- PROVIDE FACTORY MOUNTED DISCONNECT SWITCH. PROVIDE WITH MANUFACTURER'S ELECTRONICALLY COMMUTATED (EC) MOTOR.

		UNIT	HEATI	ER SC	CHE	DULI	Ξ (Ε	LEC	TRIC	2)		
MARK	AREA SERVED	MANUFACTURER	MODEL	MIN OUT (MBH)	NOM (KW)	MIN NO OF STAGES	CFM	MOTOR HP	THROW (FT)	V/PH	DISC TYPE	NOTES
UH 1	WATER ENTRY	QMARK	MUH03-81	10.2	3.0	1	350	0.01	12	208/1	NON-FUSED	A-D
UH 2	ELECTRICAL	QMARK	MUH03-81	10.2	3.0	1	350	0.01	12	208/1	NON-FUSED	A-D
UH 3	STORAGE	QMARK	MUH05-81	17.0	5.0	1	350	0.01	12	208/1	NON-FUSED	A-D

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- A. MOUNT 10 FEET ABOVE FINISHED FLOOR WITHOUT OBSTRUCTING AIRFLOW. PROVIDE WITH WALL MOUNTED THERMOSTAT.
- PROVIDE NECESSARY MOUNTING BRACKET AND ACCESSORIES FOR HORIZONTAL DISCHARGE. PROVIDE FACTORY MOUNTED DISCONNECT SWITCH INSTALLED ON SERVICE SIDE OF UNIT.

		COM	PUTE	ER F	30	OM	1 UI	VIT	SC	HEI	DUL	E (DX	CO	OLI	NG	3)		
				SUI	PPLY F	٩N			COOL	NG COIL			HUN	/IDIFIER	El	ECTRIC	CAL		
			REFR		ESP		TC	SC	E	ΑΤ	LA	١T						WEIGHT	ı
MARK	MANUFACTURER	MODEL	TYPE	CFM	(IN)	HP	(MBH)	(MBH)	(°F DB)	(°F WB)	(°F DB)	(°F WB)	KW	LBS / HR	V/PH	MCA	MOCP	(LBS)	NOTES
CRU 1	LIEBERT	VS042AD	R407C	6060	0.5	3.75	127.0	115.0	75.0	61.0	57.7	53.6	4.8	11	208/3	96	110	1550	A-H
CRU 2	LIEBERT	VS042AD	R407C	6060	0.5	3.75	127.0	115.0	75.0	61.0	57.7	53.6	4.8	11	208/3	96	110	1550	A-H

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

- A. ASSOCIATED CONDENSING UNIT SHALL BE BY THE SAME MANUFACTURER. EQUIPMENT SIZED FOR 105°F AMBIENT TEMPERATURE.
- PROVIDE 2" MERV 8, EFFICIENT THROWAWAY AIR FILTERS.
- PROVIDE GRAVITY OPERATED BACKDRAFT DAMPER AT UNIT DISCHARGE. UNIT SHALL CONTAIN MINIMUM 2 SEMI-HERMETIC COMPRESSORS TO PROVIDE MINIMUM OF 2 STAGES OF COOLING. PROVIDE UNIT WITH INTEGRAL STARTER AND NON-FUSED DISCONNECT SWITCH.
- PROVIDE FRONT INLET WITH MANUFACTURER RETURN GRILLES. H. PROVIDE TOP DISCHARGE WITH DUCT CONNECTION.

CO	MPUTE	R ROC	OM C	ONE	DEN	ISIN	IG L	JNIT	
SERVICE	MANUFACTURER	MODEL	AMBIENT (°F)	VOLTS	PH	MCA	MOCP	WEIGHT (LBS)	NOTES
CRU 1	LIEBERT	MCM080E8	105	208	3	6	15	450	A,B,C
CRU 2	LIEBERT	MCM080E8	105	208	3	6	15	450	A,B,C

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- A. CONTRACTOR SHALL VERIFY WITH EQUIPMENT SUPPLIER EXACT ROUTING AND SIZE OF INSULATED REFRIGERANT PIPING. INSTALL PER MANUFACTURERS RECOMMENDATIONS.
- PROVIDE FACTORY MOUNTED DISCONNECT SWITCH.
- PROVIDE 2-FAN DUAL CIRCUIT CONDENSER. UNIT SHALL OPERATE DOWN TO ZERO DEGREES FAHRENHEIT.

		GRILL	E, RE	GISTER	AND DIF	FUSER	SCHEDL	JLE		
MARK	SERVICE	MANUFACTURER	MODEL	CONSTRUCTION TYPE	FACE TYPE	MOUNTING LOCATION	FACE SIZE (IN)	MAX NC	MAX PRESS DROP (IN W.C.)	NOTES
CEG1	EXHAUST	PRICE	80	ALUMINUM	EGGCRATE	CEILING	12"x12"	25	0.08	B,C,F,H
CSD1	SUPPLY	PRICE	SCD	STEEL	SQUARE CONE	CEILING	12"x12"	25	0.08	A,B,C,F
CTG1	TRANSFER	PRICE	80	ALUMINUM	EGGCRATE	CEILING	12"x12"	25	0.08	B,C,F
DSR1	SUPPLY	PRICE	520	STEEL	LOUVERED	DUCT	REFER TO PLANS	25	0.08	B,D,E,F,G
DSR2	SUPPLY	PRICE	510	STEEL	LOUVERED	DUCT	REFER TO PLANS	30	0.08	B,D,F,G
WEG1	EXHAUST	PRICE	630	ALUMINUM	LOUVERED	WALL	REFER TO PLANS	25	0.08	B,D,F,G
WRG1	RETURN/TRANSFER	PRICE	530	STEEL	LOUVERED	WALL	REFER TO PLANS	25	0.08	B,D,F,G

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

- A. 4-WAY THROW PATTERN UNLESS OTHERWISE INDICATED BY FLOW ARROWS ON DRAWINGS. NECK SIZE SHOWN ON DRAWINGS. PROVIDE BRANCH DUCT TO MATCH NECK SIZE UNLESS OTHERWISE SHOWN ON DRAWINGS.
- BAKED ENAMEL FINISH, WHITE TO MATCH CEILING COLOR. FRONT BLADES PARALLEL TO LONG DIMENSION. DOUBLE DEFLECTION BARS SHALL BE ADJUSTABLE
- FRAME TYPE TO MATCH CEILING/WALL CONSTRUCTION, COORDINATE WITH ARCHITECTURAL REFLECTED CEILING/WALL PLAN.

BAKED ENAMEL FINISH, PAINT TO MATCH WALL/DUCT COLOR. COORDINATE WITH ARCHITECT FOR FINISH COLOR. PROVIDE OPPOSED BLADE DAMPER ADJUSTABLE FROM FACE OF DEVICE.

3151 NW PARAGON PKWY

Proje	ct No.:	19050.02
Date:		08/06/2021
Issue	d For:	PERMIT SET
No.	Date	REVISIONS Description
		-

REGISTRATION



LICENSE # 028603

PRO	JECT TEAM
ARCHITECT	FINKLE+WILLIAMS ARCHITECTURE
CIVIL	GBA
LANDSCAPE	HOERR SCHAUDT LAND3

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

> BSE STRUCTURAL **ENGINEERS**

PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON **ENGINEERS**

STRUCTURAL

ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON CONTRACTOR FOGEL ANDERSON



SHEET TITLE

MECHANICAL SCHEDULES

- GENERAL INSTRUCTIONS
- A. GENERAL REQUIREMENTS All requirements under Division 01 and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01. this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

system as implied by the design and the equipment specified.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

anu	1000 Edition are as follows.	
	2004 Edition	1995
Edition	on	
1.	Division 21 – Fire Suppression	Division 15
2.	Division 22 – Plumbing	Division 15
3.	Division 23 – HVAC	
	Division 15	
4.	Division 26 – Electrical	Division 16

Division 27 – Communications

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.

Division 28 – Electronic Safety and Security

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Division 16

Division 16

Provide: "to furnish and install."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete and ready for intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division. Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

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

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

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ

C. PREBID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

D. MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Install material and equipment in accordance with the manufacturer's installation instructions. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model numbers.

Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM

Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes and laws.

The complete installation shall function as designed and intended with respect to efficiency, capacity, noise level, etc. Abnormal noise caused by rattling equipment, piping, ducts, air devices, and squeaks in rotating components shall not be acceptable. Materials and equipment shall be of commercial specification grade in quality. Light duty and residential grade equipment shall not be accepted unless otherwise indicated.

Remove from the premises waste material present as a result of work, including cartons, crating, paper, stickers, and/or excavation material not used in backfilling, etc. Clean equipment installed under this contract to present a neat and clean installation at the termination of the work.

Repair or replace public and private property damaged as a result of work performed under this contract to the satisfaction of authorities and regulations having jurisdiction. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety

E. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years. COORDINATION

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.

Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute work in a manner as to not interfere with or delay the work of other trades.

Figured dimensions shall be taken in preference to scale dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.

Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim.

G. ORDINANCES AND CODES

Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having iurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following:

Occupational Safety and Health Administration (OSHA)

National Electrical Code (NEC) National Fire Protection Association (NFPA) Underwriters Laboratories (UL)

American Society of Mechanical Engineers (ASME) American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) American National Standards Institute (ANSI)

Other national standards and codes where applicable Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence.

American Society of Testing and Materials (ASTM)

Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent. Promptly bring all conflicts observed between codes, ordinances, rules,

regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution. Contractor will be held responsible for any violation of the law. Procure and pay for permits and licenses required for the accomplishmen

of the work herein described. Where required, obtain, pay for, and furnish certificates of inspection to Owner.

H. PROTECTION OF EQUIPMENT AND MATERIALS

Store and protect from damage equipment and materials delivered to job site. For materials and equipment susceptible to changing weather. conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dust, dirt, paint, water, or physical damage. Replace insulation that has become wet at any time during construction. Drying the insulation is not acceptable. Seal any tears or joints of internal fiberglass insulation. Equipment and material damaged by construction activities shall be rejected and Contractor shall furnish new equipment and material of a like kind at his own expense.

Keep premises broom clean of foreign material created during work performed under this contract. Piping, equipment, etc. shall have a neat and clean appearance at the termination of the work. Remove debris from ceiling/return air plenum, including dust.

Plug, seal, or cap open ends of ductwork and piping systems while stored and installed during construction when not in use to prevent the entrance of debris into the systems. Remove temporary protection prior to starting equipment and turning the system over to the owner.

I. SUBSTITUTIONS

Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request Form for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following: Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts. 3. Proposed substitution has received necessary approvals of

4. Same warranty will be furnished for proposed substitution as for specified Work. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents.

J. SUBMITTALS

Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these contract documents and the design concept. Prior to transmitting submittals, verify that the equipment submitted is mutually compatible and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for resubmittal, if required. Only resubmit those sections requested for resubmittal.

Submittals shall contain the project name, applicable specification section, submittal date, equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review. Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product

Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. For equipment with motor starters or VFDs, include short circuit current ratings. Mark out inapplicable items. Shop drawings will be returned without review if the above mentioned requirements are not met.

of the Engineer. If the Contractor desires to use elements of such product,

refer to paragraph "Electronic Drawing Files" for procedures to be used.

Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website. user name, and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic

The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, size of members, or quantities, omissions of components or fittings; coordination of electrical requirements; and not coordinating items with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

In preparation of shop drawings or record drawings, Contractor may, at his

K. ELECTRONIC DRAWING FILES

submittal.

option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive or direct download, as desired, from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, the written authorization from the Architect and release agreement form from the Engineer must be received before electronic drawing files will be sent.

RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

See Division 01 and General Conditions for additional information. M. OPERATION AND MAINTENANCE INSTRUCTIONS

During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment manufacturer. Include an inside cover sheet that lists the project name. date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of contents.

Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect, for Engineer's review, at the termination of the work. Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment itself for inclusion in this brochure.

Include Record Drawings as described above.

TRAINING

Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements. SPARE PARTS

Furnish to Owner, with receipt, the following spare parts for the equipment furnished for this project: One set of spare filters of each type required for each unit. In addition to the spare set of filters, install new filters prior to testing, adjusting, and balancing work and before turning system over to Owner Furnish one complete set of belts for each fan. Furnish three operating keys for each type of air outlet and inlet that require them.

At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of the equipment provided for this project.

Provide training to include, but not be limited to, an overview of the system and/or equipment as it relates to the facility as a whole; operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention; and review of data included in the operation and maintenance manuals.

Submit a certification letter to the Architect stating that the Owner's designated representative has been trained as specified herein. Letter shall include date, time, attendees and subject of training. The Contractor and the Owner's representative shall sign the certification letter indicating agreement that the training has been provided.

Schedule training with Owner with at least 7 days advance notice. WARRANTIES

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner and to the satisfaction of the Owner, Architect, and Engineer.

Perform the remedial work promptly, upon written notice from the Engineer At the time of Substantial Completion, deliver to the Owner all warranties,

GENERAL MATERIALS AND INSTALLATION

in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

Comply with the schedule of operations as outlined in the architectural portions of this specification. Accomplish work requiring interruption of building operation at a time when the building is not in operation and only with written approval of building Owner and/or tenant. Coordinate interruption of building operation with the Owner and/or tenant a minimum of seven (7) days in advance of work.

B. COINCIDENTAL DAMAGE

Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of the work. Repair materials shall match existing construction. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the Architect.

CUTTING AND PATCHING

Conform to the requirements in Division 01. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this division. Obtain permission from the Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer, For post-tension slabs, x-ray slab and closely coordinate all core drill locations with Architect and Structural Engineer prior to performing any work. Obtain approval from Architect and Structural Engineer for all core drills and penetrations at least four days prior to performing work. Penetrations shall be made as small as possible while maintaining required clearances between the building element penetrated and the system component. Patch around openings to match the adjacent construction including fire ratings, if applicable. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

ROUGH-IN

Coordinate without delay all roughing-in with other divisions. Conceal piping, conduit, and rough-in except in unfinished areas and where

CONCRETE BASES

Provide concrete bases (e.g., housekeeping pads) for equipment where indicated on the drawings and as specified herein. Concrete bases shall have chamfered edges. Size of base shall be a minimum of 4 inches greater than the footprint of the equipment that it is supporting and shall have a minimum height of 3-1/2 inches.

Construct equipment bases of a minimum 28 day, 4000 psi concrete conforming to American Concrete Institute Standard Building Code for Reinforced Concrete (ACI 318-99) and the latest applicable recommendations of the ACI standard practice manual. Concrete shall be composed of cement conforming to ASTM C150 Type I, aggregate conforming to ASTM C33, and potable water. Exposed exterior concrete shall contain 5 to 7 percent air entrainment.

conforming to ASTM A615 or 6x6 - W2.9 x W2.9 welded wire mesh conforming to ASTM A185. Place reinforcing bars 24 inches on center with a minimum of two bars each direction Provide galvanized anchor bolts for equipment placed on concrete equipment bases and housekeeping pads or on concrete slabs. Anchor bolts size, number and placement shall be as recommended by the

Unless otherwise specified or shown on the structural drawings, reinforce

equipment bases and housekeeping pads with No. 4 reinforcing bars

manufacturer of the equipment.

F. STRUCTURALSUPPORT SYSTEMS Structural steel used for support of equipment, ductwork and piping shall be new, clean, and conform to ASTM Designation A-36. Support mechanical components from the building structure. Do not

electrical components, and other non-structural elements. G. PRE-ENGINEERED ROOF EQUIPMENT SUPPORTS AND

support mechanical components from ceilings, other mechanical or

Provide prefabricated equipment support rails and roof curbs manufactured by AES Industries, Custom Curb, Inc., Pate Company, Thybar or approved equal. Provide with fully mitered raised cant and step to match roof insulation thickness, welded, minimum 18 gauge galvanized steel shell, internally reinforced to load bearing factors of equipment being supported, minimum 1-1/2 inch thick, 3 pound rigid insulation internal to shell to maintain continuous roof insulation where required, factory installed wood nailer, and minimum 18 gauge jacket with counterflashing where equipment does not fully cover the equipment support. Provide sloped roof equipment supports to enable level installation. Provide rigid backing material behind cant to maintain cant slope. Provide multiple support rails to uniformly support the equipment. Attach to roof structure according to manufacturer's installation instructions.

Attach equipment directly to pre-engineered roof equipment support using one of the following methods: Rail Equipment Supports: Secure each equipment support leg to the rail with a minimum of 4 points of connection per leg. Roof Curbs: Secure each corner of the equipment to the curb nailer using a minimum of 4 lag screws, located along the length of the equipment. Alternatively, Secure equipment to the curb using hold-down brackets. Provide minimum 6 inch long, 14 gauge galvanized steel brackets sized to wrap around top of curb and under equipment base rail with sufficient horizontal offset to cover overlap gap between the equipment rail and curb. Secure bracket to equipment and curb nailer using a minimum of 8 points of connection per bracket. Provide one bracket at each corner along the length of the unit. Submit signed and sealed drawings that indicate the design and installation requirements of pre-engineered roof supports can withstand the design criteria listed. Include installation requirements for anchoring to the roof structure. The Engineer is not responsible and will not provide the seal and signature. Deliver submittal to the local AHJ for approval prior to installation of the contractor provided, pre-engineered roof supports.

H. ACCESS PANELS AND DOORS

Refer to Architectural documents for specification of access panels and

Provide access doors for all concealed equipment and duct and piping accessories that require service where indicated or as required, except where above lay-in ceilings. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction for type of construction in which it is installed. Obtain Architect's approval of type, size, location and color before ordering. Provide factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation, concealed hinges, flush screwdriver-operated cam lock, and anchor straps. Provide access doors manufactured by Greenheck, Milcor, Titus, Zurn, or equal. I. PENETRATIONS

Provide sleeves for pipes passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide 10 gauge galvanized steel sleeves for sleeves 6 inches and smaller. Provide galvanized sheet metal sleeves for larger than 6 inches. Schedule 40 PVC sleeves are acceptable for installation in areas without return air plenums.

Seal elevated floor, exterior wall and roof penetrations watertight and weathertight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of 1/2 inch of sealant. Seal around penetrations of fire rated assemblies. Coordinate fire ratings and locations with the architectural drawings. Refer to architectural specifications for fire stoppings. Provide a product schedule for UL listing, location, wall or floor rating and installation drawing for each penetration fire stop system.

Extend pipe insulation for insulated pipe through floor, wall and roof penetrations, including fire rated walls and floors. The vapor barrier shall be maintained. Size sleeve for a minimum of 1 inch annular clear space between inside of sleeve and outside of insulation. Provide prefabricated roof curbs where pipes and or ductwork penetrate

elevated slabs or the roof to the exterior. Provide cover over curb of

box openings not shown on the Architectural or Structural drawings.

cover. Provide pipe collar of weather-resistant material with stainless steel pipe clamps for piping penetrations. Provide box frames for rectangular openings welded 12 gauge galvanized steel attached to forms and of a maximum dimension established by the Architect. Notify the General Contractor or Architect before installing any

weather-resistant material and seal duct or pipe penetrations through the

Seal concrete or masonry exterior wall penetrations below grade with "wall pipes" and mechanical sleeve seals. Provide cast iron "wall pipes" with integral waterstop ring manufactured by Jay R. Smith, Josam, Wade, Watts or Zurn. Provide modular mechanical sleeve seals, manufactured by Calpico, Metraflex, or Thunderline / Link Seal.

"wall pipes" and water proof sealant. Secure waterproof membrane flashing between "wall pipe" clamping flange and clamping ring. Provide cast iron "wall pipes" with integral waterstop ring manufactured by Jay R. Smith, Josam, Wade, Watts or Zurn. Provide sleeves for horizontal pipe passing through or under foundation.

Seal elevated concrete slab with water proof membrane penetrations with

Sleeves shall be cast iron soil pipe two nominal pipe sizes larger than the pipe served. Provide Schedule 40 PVC pipe sleeves for vertical pressure pipe passing through concrete slab on grade. Sleeves shall be one nominal pipe size

larger than the pipe served and two pipe sizes larger than pipe served for ductile iron pipes with restraining rods. Seal water-tight with silicone caulk. Provide 1/2 inch thick cellular foam insulation around perimeter of nonpressure pipe passing thru concrete slab on grade. Insulation shall extend to 2 inches above and below the concrete slab. FIRESTOPPING

Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL acceptable to AHJ. Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United

States Gypsum Company, or 3M corp. Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire stop system.

Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications data for testing agency.

K. MOTORS AND STARTERS

Provide motors and starting equipment where not furnished with the equipment package. Motors shall have copper windings, Class B insulation, and standard squirrel cage with starting torque characteristics suitable for the equipment served. Motors controlled by variable frequency drives shall be rated for voltage peaks and minimum rise times in accordance with NEMA MG1, Part 31. Motors 5 horsepower and larger controlled by variable frequency drives shall be provided with a shaft grounding system equal to Aegis SGR Bearing Protection Ring, Inpro/Seal Current Diverter Ring (CDR) or approved equal. Motors for air handling equipment shall be selected for quiet operation. Each motor shall be checked for proper rotation after electrical connection has been completed. Provide drip-proof enclosure for locations protected from weather and not in air stream of fan; and totally enclosed fan cooled enclosure for motors exposed to weather. Motors shall be manufactured by Century, General Electric, Louis Allis, Westinghouse, or approved

Provide every motor, except fractional horsepower single phase motors with an approved type of "built-in" thermal overload protection, with a motor starter. Each starter shall be provided with overload heaters sized to the motor rating, and every three phase motor starter shall have overload heaters in each phase. Ambient compensated heaters shall be installed wherever necessary. Unless noted otherwise, motor starters shall be furnished by the Division 23 Contractor for installation and connection by the Division 26 Contractor. Starters shall be Allen-Bradley, Clark, Furnas, Square D, or approved equal.

ELECTRICAL WIRING

High voltage wiring is defined as 50 Volts or higher. Low voltage wiring is defined as less than 50 Volts. Line voltage wiring shall be provided by Division 26. Line voltage control and interlock wiring for mechanical systems shall also be provided by Division 26. Low voltage control wiring shall be provided by Division 23. Furnish wiring diagrams to Division 26 as required for proper equipment hookup. Coordinate with Division 26 the actual wire sizing amps for mechanical equipment (from the equipment nameplate) to ensure proper installation.

Provide power and communication wiring with transient protection in accordance with IEEE C62.41.2. All control and interlock wiring shall comply with the NEC. Control wiring shall be sized to accommodate the voltage drop associated with the distance between the control device and the controller. Control wiring not installed in conduit shall be UL rated for plenum installation. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to the NEC and Division 26 requirements. Maximum allowable voltage for control wiring shall be 120 V. All lowvoltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be sub-fused when required to meet Class 2 current limit. Conduit for Control Wiring: EMT with compression fittings, cold rolled

steel, zinc coated or zinc-coated rigid steel with threaded connections. Pull and Junction Boxes: Size according to number, size, and position of entering raceway as required by National Electrical Codes. Enclosure type shall be suited to location.

Install wiring parallel to building lines wherever possible. Conceal all control wiring in finished rooms. Do not install Class 2 wiring in raceway containing Class 1 wiring. Boxes and panels containing high voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two wires (e.g., relays and transformers). All wire-to device and wire-to-wire connections shall be made at a terminal block or terminal strip. All runs of communication wiring shall be unspliced length when that length is commercially available. Verify the integrity of the entire network following the cable installation. Use appropriate test measures for each particular cable. Label all wiring and cabling at each end within 2 inches of termination with the controller termination number. Label control devices used in the system with permanent labels using the identifiers that match the record documents.

M. EQUIPMENT FURNISHED BY OTHERS

Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation of equipment furnished by others in locations as indicated on the drawings, specified herein, or both. Equipment and accessories not provided by the equipment supplier may include, but not be limited to flues, vents, intakes, associated roof jacks and caps to outdoors, dampers, in-line fans, roof fans, and control interlocks, etc. as required for proper operation of the complete system in accordance with the manufacturer's instructions

Contractor shall be responsible for correct rough-in dimensions and shall verify them with Architect and/or equipment supplier prior to service

labor and equipment required to test each system installed under this

N. SYSTEM TESTING, ADJUSTING, AND BALANCING Upon completion of each phase of the installation, test each system in conformance with local code requirements and as noted below. Furnish

contract. Assume all costs involved in making the tests and repairing and/or replacing any damages resulting therefrom. Final system testing, balancing and adjustments (TAB) shall be performed by a Contractor certified by the National Environmental Balancing Bureau (NEBB), Associated Air Balance Council (AABC), or Testing, Adjusting and Balancing Bureau (TABB). TAB shall be performed in accordance with

the most current edition of the certified agencies procedural standard for

interpretation of that standard for execution and reporting of all TAB work

testing, adjusting and balancing and shall comply with the strictest

Test, adjust, and balance equipment and systems included in the scope of work. Prepare testing and balancing report log using forms equivalent with the standard forms available from the TAB certification standard being followed. Adjust equipment to deliver specified flow amounts on the drawings. For air systems, include airflow supply quantities, entering and leaving temperatures, and pressures at design flow. For hydronic systems, include entering and leaving temperatures and pressures at design flow. Include fan and unit test readings, motor voltage and amp draws, etc., and submit six copies of the final compilation of data to the Architect for evaluation and approval before final inspection of the project.

Balance air systems to within plus or minus 10 percent for terminal devices and branch lines and plus or minus 5 percent for main ducts and air handling equipment of the amount of air shown on the drawings. TAB Contractor shall record space temperatures and make adjustments in airflow to each diffuser to obtain uniform temperature (no greater than +/- 3 F) in spaces. Document temperatures and adjustments in tab report. Balance hydronic systems to provide flow rates within plus or minus 5 percent of flow specified on drawings or as required for proper system operation. Adjust equipment to operate as intended by the specification. TAB report shall include a 'report summary/remarks' section in accordance with the procedural standard that provides both system set up and a summary of deficiencies as defined by the procedural standard.

TAB Contractor shall be responsible to calibrate, set, and adjust automatic temperature control sensors, actuators and control devices. Check proper sequencing of interlock systems, and operation of safety controls, adjust thermostats, and control setpoints, limits and time based adjustment to operate in accordance with the performance requirements of the Construction Documents. Adjust pumps, fans, etc. for proper and efficient operation. Certify to Architect that adjustments have been made and that system is operating satisfactorily. Calibrate, set, and adjust automatic temperature controls. Check proper sequencing of interlock systems, and operation of safety controls.

Division 23 contractor shall align bearings and replace bearings that have

dirt or foreign material in them with new bearings without additional cost to the Owner.

O. VIBRATION ISOLATION

Provide vibration isolation equipment and materials by a single manufacturer. If type and deflection for specific equipment is not specified within the contract documents, reference ASHRAE Handbook "HVAC Applications" or provide per manufacturer's recommendations. Approved manufacturers include Caldyn, Kinetics Noise Control, Mason Industries, Inc., Vibration Eliminator Co., Inc., Vibration Mounting and Controls, or Vibro-Acoustics, provided their systems are in compliance with the specified design and performance requirements.

General Requirements: Select vibration isolators by the weight distribution to produce uniform deflection. Vibration isolators shall have either known un-deflected heights or calibration markings so that, after adjustment, the static deflection can be verified, thus determining that the load is within the proper range of the isolator. Isolators shall operate in the linear portion of their load versus deflection curves. Spring isolators shall have 50 percent excess capacity without becoming coil bound. Coat vibration isolators with factory-applied paint. Coat vibration isolators exposed to weather and other corrosive environments with factory-applied corrosion resistance protection. Install and adjust vibration isolators in accordance with manufacturers written instructions.

Pipe connections. Provide flexible connectors for piping system connections on equipment side of shutoff valves for all pumps, mechanical equipment supported or suspended by spring isolators, and where indicated on drawings. Fabricate flexible piping connectors from stainless steel or rubber materials as suitable for system fluid. Flexible piping connectors shall be bellows, spherical or braided hose type as recommended by the manufacturer for the application.

Isolator Types: Type WP (Waffle Pads): Provide 5/16 inch thick neoprene pads ribbed or waffled on both sides. Manufacture pads with bridge bearing quality neoprene and select for a maximum durometer of 50 and designed for 15 percent strain, with a static deflection of 0.05 inches. Incorporate steel load-spreading plates where required between the equipment and the neoprene pad to provide selected deflection. If the isolator is bolted to the structure, install a neoprene mounting sleeve under the bolt head between the steel washer and the base plate to prevent metal to metal contact. Provide Mason Industries Type W or equal.

2. Type SPNH (Spring and Neoprene Hangers): Provide a steel hanger box containing a laterally stable, double-deflecting neoprene isolator in series with a steel spring. Design springs so the ratio of the horizontal to vertical spring constant is between one and two. The spring diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Loaded springs shall operate within the linear portion of their load versus deflection curve over a deflection range of not less than 50 percent above design deflection. Spring diameter and hanger box hole size shall be large enough to permit the hanger rod to swing through a 30 degree arc. Include a neoprene bushing to prevent contact between the lower hanger rod and hanger box and short-circuiting the isolating function. The neoprene element shall have a maximum durometer of 50 and designed for 15 percent strain, with a static deflection of not less than 0.4 inches. Unless otherwise specified, the static deflection of SPNH hangers shall be 2 inches. Provide SPNH hangers with 1 inch static deflection for water source heat pumps and fan-powered VAV terminal units. When installed, do not cock the spring element and do not allow the hanger box to rotate through a full 360 degree arc without encountering obstructions. Provide Mason Industries Type 30N or equal.

P. AIR FILTERS Provide AAF/Flanders PrePleat 13, Camfil AP-Thirteen, pleated, throwaway type filters, minimum MERV 13, or similar as manufactured by Air Filter, Inc., Bioclimatic, Columbus, Koch, or approved equal, unless otherwise indicated.

Temporary filters used to protect openings in ductwork and inside equipment when permanent HVAC equipment is used during the construction period shall be pleated, throwaway type filters, minimum

Q. REFRIGERANT AND OIL

systems, and maintain it for full term of the guarantee. R. IDENTIFICATION Provide manufacturer's standard pre-printed, semi-rigid snap-on or

Provide full refrigerant and oil charge in new air conditioning refrigeration

pipe markers to comply with ANSI A13.1. Install pipe markers on each HVAC piping system and include arrows to show normal direction of flow.

Locate pipe markers and color bands wherever piping is exposed to view

permanent adhesive, pressure-sensitive vinyl pipe markers. Color code

in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations. Provide plastic laminate or brass valve tag on every valve, cock and control device in each HVAC piping system; exclude check valves, valves within factory-fabricated equipment units, and shut-off valves at HVAC terminal devices and similar rough-in connections of end-use fixtures and

markers. Conform to the following color code: Green for Cooling; Yellow for Heating; Yellow/Green for combination Cooling and Heating; Brown for Energy Reclamation; Blue for other equipment types. Conform to ANSI A13.1 for Hazardous Equipment. Provide stenciled signs for equipment identification at Contractor's option

or where distance of required identification requires lettering larger than 1

inch height. Stencil paint shall be exterior type, oil-based, alkyd enamel,

minimum 1-1/4 inch height or greater as required for long distance

identification, white or black color for best contrast.

Provide manufacturer's standard laminated plastic, color coded equipment

Provide duct markers or provide stenciled signs and arrows indicating ductwork service and flow direction in black or white lettering for best contrast with duct or insulation color. Locate markers maximum 50 feet along each duct side and within 5 feet of all control and balancing dampers or branch ducts more than 25 feet length and within 5 feet on each side of wall, floor, and ceiling penetrations. Provide additional markers in congested areas or at multiple duct runs as required for clarity.

DUCT INSULATION, DUCTWORK, ACCESSORIES, AND FANS DUCT INSULATION

Provide fiberglass duct liner with fibers firmly bonded together with a thermosetting resin. Liner surface shall serve as a barrier against infiltration of dust and dirt, shall meet ASTM C1338 for fungi resistance, and shall be cleanable using duct cleaning methods and equipment outlined by North American Insulation Manufacturers Association (NAIMA) duct cleaning guide. Install with liner adhesive and mechanical fasteners in accordance with manufacturer's instructions and recommendations. Ductwork sizes shown on drawings are inside clear dimensions. Increase sheet metal by liner thickness in both directions where liner is installed.

Provide rectangular liner conforming to ASTM C1071, Type I or II that is 1-1/2 inch thick, 1-1/2 pound density, minimum R-6.3 Certainteed Corp. "Toughgard" or equivalent, Johns Manville, Owens-Corning, or Knauf. Provide round liner that is 1-1/2 inch thick, 4 pound density, minimum R-6.4 Johns Manville "Spiracoustic Plus" or equivalent, Certainteed or Owens-Corning.

Provide liner on the following interior air ducts and where specified on the

Exposed round and rectangular supply ductwork. At interface of lined and wrapped ductwork, overlap lined ductwork at least

2 feet beyond wrapped insulation.

B. DUCTWORK

Cover concealed, rigid ductwork with ASTM C553, Type II flexible fiberglass insulation. Installed insulation shall be 2-1/4 inch thick, 3/4 pound density, minimum R-6.0 duct wrap, Certainteed or equivalent Johns Manville, Owens-Corning, or Knauf with heavy-duty foil-scrim-kraft facing, and with joints taped with 3 inch wide foil tape as follows:

Unlined Round and rectangular supply and return air ductwork Unlined Round and rectangular outside air ductwork. Round and rectangular exhaust and relief air ductwork within 10 feet of exterior discharge. Cover Outdoor air, Exhaust air and Relief air plenums connected to

exterior louvers with 1-1/2 inch thick, 1.5 pound density, rigid fiberglass

insulation conforming to ASTM C612, Class 2. Insulating materials, adhesives, coatings, etc., shall not exceed flame spread rating of 25 and smoke developed rating of 50 per ASTM E84. Containers for mastics and adhesives shall have U.L. Label.

Provide galvanized steel ductwork and housings as shown on drawings. Construct ductwork including fittings and transitions in conformance with current SMACNA standards relative to gauge, bracing, joints, etc. Minimum thickness of duct shall be 26-gauge sheet metal. Reinforce housings and ductwork over 30 inches with 1-1/4 inch angles not less than 5'-6" on centers, and closer if required for sufficient rigidity to prevent vibration. Support horizontal runs of duct from strap iron hangers on centers not to exceed 8'-0". Do not support ceiling grid, conduits, pipes, equipment, etc. from ductwork. Coordinate routing of ductwork with other contractors such that piping, electrical conduit, and associated supports are not routed through the ductwork.

Elite Components, ERICO, FNW, Miro, PHD Manufacturing, PHP Systems, Roof Top Blox, Unistrut (Atkore), Zsi Foster, or approved equal. Support ductwork on the roof with pre-engineered roof duct supports that rest on top of the roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with embedded support fixtures as required to support the duct. Provide steel pedestal type supports with minimum 18x18 inch thermoplastic or rubber base or 4 inch wide closed-cell polyethylene block with length as required. Maintain minimum 6 inches clearance under duct to finished roof surface.

Construct non-VAV supply ducts to meet SMACNA positive pressure of 2

inches w.g. Construct Return, Outdoor and Exhaust ductwork upstream of

fans to meet SMACNA negative pressure of 1 inch w.g. Construct exhaust

Provide pre-engineered roof duct supports supports by Cooper B-Line,

ductwork downstream of fans to meet SMACNA positive pressure of 1 Provide mill phosphatized or galvanealed finish for exposed ductwork to be field painted. Shop treated sheet metal shall have galvanized metal

primer applied in the shop after fabrication and prior to shipping.

Seal ductwork with heavy liquid sealant, Hardcast Irongrip 601, Design Polymer DP 1010, United Mcgill duct sealer or approved equal, applied according to sealant manufacturer's instructions. Seal all longitudinal and transverse ductwork joints airtight to meet SMACNA Seal Class A. Tapes and mastics shall be listed and labeled in accordance with UL 181A.

Provide radius elbows, turns, and offsets with a minimum centerline radius of 1-1/2 times the duct width. Where space does not permit full radius elbows. provide short radius elbows with a minimum of two continuous splitter vanes. Vanes shall be the entire length of the bend. Provide mitered elbows where space does not permit radius elbows, where shown on the drawings, or at the option of the contractor with the engineer's approval. Mitered elbows less than 45 degrees shall not require turning vanes. Mitered elbows 45 degrees and greater shall have single thickness turning vanes of same gauge as ductwork, rigidly fastened with guide strips in ductwork. Vanes for mitered elbows shall be provided in all supply and exhaust ductwork and in return and outside air ductwork that has an air velocity exceeding 1000 fpm. Do not install vanes in grease ductwork. The use of square throat, radius heel elbows is prohibited. Remove and replace all installed elbows of this type with an approved elbow at no additional cost to the owner.

Connect ducts to vibrating equipment and when transitioning between two different metallic duct materials (e.g., aluminum to galvanized steel) by means of flexible connectors. Flexible connectors shall be neoprene coated glass cloth canvas connections, Duro-Dyne, Elgen, Ventfabric or equal. Flexible connectors shall have a flame spread of 25 or less and smoke developed rating not higher than 50. Make airtight joints and install with minimum 1-1/2 inches slack.

Provide balancing dampers, manufactured by Cesco, Greenheck, Louvers & Dampers, Nailor Industries, Pottorff, Ruskin, Tamco, or approved equal, where shown on drawings and wherever necessary for complete control of air flow. Splitter dampers shall be controlled by locking quadrants; provide Young Regulator or Ventlok end bearings for the damper rod. Rectangular volume dampers shall be opposed blade interlocking type. Round volume dampers shall be single-blade type consisting of circular blade mounted to a shaft. Provide "spin-in" fitting with standoff connection and volume damper or Flexmaster model STO or equal 45 degree rectangular/round side takeoff fitting with model BO3 damper with locking quadrant and insulation build out for round ductwork branch takeoffs to individual air devices. Omit damper at takeoff fitting when damper is located downstream of takeoff.

Where access to dampers through a hard ceiling is required, provide a concealed, remote cable-operated, butterfly-type volume damper assembly with external worm gear operator. Damper assembly shall include duct casing with rolled bead stiffeners, reinforced blade, selflubricating bearing, and remote operator mounting plate. External operator shall attach to damper as a single piece with no linkage adjustment required. Damper shall be adjustable through the diffuser frame with standard 1/4 inch nutdriver or flat screwdriver. Provide positive, direct, two-way damper control with no sleeves, springs or screw adjustments to come loose after installation. Provide cable length to span the distance from the damper to the remote operator location. Install damper in branch duct. Do not install in diffuser neck. Install remote operator on the back of the diffuser frame or side of a slot diffuser plenum. Support cable assembly to avoid bends and kinks in cable at manufacturer recommended intervals. Where approved by architect, a ceiling cup with cover plate may be used for access to cable operator. Provide round dampers by Metropolitan Air Technology model RT-250, Young's Regulator model 5020-1200, or approved equal. Provide rectangular dampers by Metropolitan Air Technology model RT-200, Young's Regulator model 820-1200, or approved equal. Provide remote cable control by Metropolitan Air Technology model RT-WGA, Young's Regulator model 270-275, or approved equal.

Round or oval ductwork shall be FlaktGroup Semco. United. Hercules Industries or equal, sheetmetal, with smooth interior surface, with low pressure (duct pressure class up to and including 2 inches w.g.) Round ductwork gauges per the following table (reference SMACNA HVAC duct construction standards for gauges when pressures exceed 2 inches w.g.)

Fitting Gauge

38" thru 50" Lewis & Lambert, Linx Industries Lindab Safe, or approved equal factorymanufactured round ductwork and fittings may be substituted for specified round branch ductwork, at Contractors option. Heavy liquid joint sealant

may be omitted on factory-manufactured round ductwork.

Duct Gauge

15" thru 26"

28" thru 36"

Low pressure (duct pressure class up to and including 2 inches w.g.) Fittings 24 inches in diameter and less shall be prefabricated, spot-welded and internally sealed. Continuously weld fittings larger than 24 inches in diameter. Fitting gauge shall be 22 gauge for 36 inch fittings and under, 20 gauge for larger sizes. 90 degree tees shall be conical type. Seal longitudinal and transverse ductwork joints airtight with heavy liquid sealant applied according to manufacturer's instructions. Provide gauge thickness in medium pressure (duct pressure class 3 inches to 6 inches w.g.) ductwork as recommended by SMACNA.

rope duct hanging system. Provide Ductmate WR10 through WR40 or Gripple No. 1 through No. 5 wire rope using 7x7 or 7x19 aircraft quality zinc coated cable or galvanized steel wire rope. Secure wire rope to duct using Ductmate Clutcher or Gripple hang fast adjustable rope attachment. For seismic applications, wire rope systems shall be seismic tested, conforming to GR 63. Level 4 Seismic. Where applicable for upper attachment, provide Ductmate EZ-Lock wire rope beam clamp with locking nut adjustment or Gripple ceiling, beam, or purlin clips. Wire rope, adjustable duct attachment, and upper attachment to structure shall each have minimum 5 to 1 load safety factor.

At Contractors option, provide Ductmate, Gripple, or approved equal wire

If permanent HVAC equipment is used during the construction period, provide temporary filters at all openings in the ductwork and inside equipment to protect the system from dust, dirt, paint, and moisture. Replace and maintain filters when needed, but not less than every month. On the day of Substantial Completion, clean the unit and ductwork and provide a new set of filters in the unit. Refer to section "Air Filters" for filter requirements.

An independent, professional duct cleaning company shall vacuum clean all internal surfaces of equipment, coils, and ductwork connected to permanent HVAC units that are operated during the construction period. Conduct cleaning after new air filters are installed and prior to turning the

system over to the owner.

C. FLEXIBLE DUCT

Low pressure (duct pressure class up to and including 2 inches w.g.) and medium pressure (duct pressure class 2.1 inch to 6 inches w.g.) flexible duct shall be Flexmaster type 5B, Thermaflex type G-KM, M-KE, JPL type Silver Jacket, or equal (fire retardant polyethylene) protective vapor barrier, U.L.181 Class 1, acoustical insulated duct, R-6.0 fiberglass insulation. Provide CPE liner with steel wire helix mechanically locked or permanently bonded to the liner.

Flexible duct runs shall not exceed 5 feet in length, and shall be installed fully extended and straight as possible avoiding tight turns. Install flexible duct in accordance with manufacturer's instructions. Support flexible duct at maximum 5 feet on center and within 6 inches of bends. Bends shall not exceed a centerline radius of one duct diameter. Duct sag shall not exceed 1/2 inch. Supporting material in direct contact with the duct shall not be less than 1-1/2 inches in width.

Connect flexible duct to rigid metal duct or air devices as recommended by the manufacturer. At a minimum, install two wraps of duct tape around the inner core connection and a metallic or non-metallic clamp over the tape and two wraps of duct tape or a clamp over the outer jacket. Duct clamps shall be labeled in accordance with UL-181B and marked 181B-C. Duct tape shall be labeled in accordance with UL 181B and marked 181B-

D. AIR DEVICES

Provide air devices as scheduled on drawings, manufactured by Carnes, Krueger, Metalaire, Nailor Industries, Price, Titus, or Tuttle & Bailey. Select air devices to limit room noise level to no higher than NC-30 unless otherwise shown. Provide devices with a soft plastic gasket to make an airtight seal against the mounting surface. Coordinate final location, frame, and mounting type of air devices with Architectural reflected ceiling plans.

pressure drop, throw, CFM for each air device, styles, borders, etc. Clearly marked with specified equipment number. Submit samples of each air device as requested by the Engineer. Provide wall return air grilles and exhaust air registers with horizontal 35 or 45 degree angle vision-proof bars. Provide concealed fasteners for wall mounted registers and grilles. Provide floor supply air registers of

aluminum heavy duty type with 0 degree deflection. Provide opposed

blade dampers for supply air registers and exhaust air registers unless

Submit complete shop drawings including information on noise level,

indicated otherwise. Provide ceiling mounted air devices of lay-in or surface mounted type as required to be compatible with ceiling construction. Provide ceiling diffusers and grilles with white enamel finish unless noted otherwise.

E. EXHAUST AIR SYSTEMS

Provide roof mounted exhaust fans as scheduled on the drawings, or egual ACME, Carnes, Cook, Greenheck, Pennbarry, or Twin City Fans complete with aluminum housing, aluminum centrifugal wheel, motor with integral thermal overload protection, disconnect switch mounted inside the housing, birdscreen, backdraft damper, and pre-engineered roof curb. Three phase fans shall be furnished with magnetic starters with push button station.

HVAC EQUIPMENT

A. ROOFTOP UNITS (ELECTRIC HEAT)

Provide electric cooling, electric heating rooftop units as scheduled on the drawings, manufactured by Aaon, Carrier, Daikin, Lennox, Johnson Controls. Trane. or York, with features as scheduled in the RTU Control Matrix, and complete with factory installed direct-drive hermetic compressors with internal spring vibration isolation, built-in motor thermal overload protection, crankcase heater, and low pressure switches; direct expansion cooling and condensing coils with 1 inch factory installed flexible elastomeric insulation around the suction and liquid lines not directly located above a condensate drain pan and protective UV coating on any insulation exposed to sunlight, minimum SEER or EER rating (cooling) as required by the applicable energy code or greater if scheduled on the drawings; centrifugal evaporator blower; air filter rack, propeller type condenser fan; electric heat modules constructed of heavy-duty nickel chromium elements (UL listed) with code required integral safety features and controls including automatic reset high limit; complete factory installed micro-processor controls including anti-short cycle timers, time delay relays and minimum "on" time controls; built-in thermal overload protection on motors and compressors; outdoor air damper; relief; weathertight housing constructed of zinc coated, heavy gauge, galvanized steel with weather-resistant baked enamel finish; pre-engineered roof curb with minimum height as scheduled on the drawings if unit is equipped with internal vibration isolators; Type CMB if unit is not equipped with internal vibration isolators; single point electrical power connection. Provide guards or louvered panels to protect the condenser coil from hail or other damage. Provide a 125 VAC, 20 amp duplex convenience receptacle mounted to unit ready for field wiring with a cover UL listed for wet and damp locations when in use. Provide electronic programmable type thermostat. Provide unit complete with manufacturer's one year guarantee on components plus an additional four year guarantee on the compressors and heat exchangers. For units equipped with an economizer assembly, the assembly shall be covered with minimum 5 year manufacturer warranty, certified to operate through 60,000 damper opening and closing cycles, and certified to meet leakage requirements specified under the

section, "Control Dampers."

ELECTRIC UNIT HEATERS Provide electric unit heaters as scheduled on the drawings, manufactured by Berko, Brasch, Indeeco, Markel, QMark, or Raywall, standard type propeller unit heaters with sidewall mounting brackets and hardware for norizontal airflow. Furnish heater fan motors complete with a manual motor starter with automatic thermal cutouts sized to the motor load,

disconnect switch, and other code required safety devices. Provide unit mounted thermostat and manual summer/winter changeover switch. COMPUTER ROOM AIR CONDITIONING UNIT SYSTEMS

Provide split system consisting of evaporator section for mounting as indicated on the plans and remote condensing section similar to Liebert, Stulz, or Trane. Evaporator cabinet shall be factory assembled per-wired consisting of furniture-grade steel with baked-enamel finish, front access, with direct-drive centrifugal fans, 2-speed motor, and filter rack. Evaporator coil shall be direct-expansion cooling coil of seamless copper tubes expanded into aluminum fins, with thermal-expansion valve with external equalizer. Air-cooled condenser shall be of corrosion-resistant cabinet containing compressor, copper-tube aluminum-fin coils, directdrive propeller fans with motors with internal overload protection; capacity control to 0 degrees Fahrenheit. A compressor shall be scroll type with a suction gas cooled motor, EPDM vibration isolators, internal thermal overloads, and automatic reset high-pressure switch, rota-lock service valve, low-pressure transducer, and crankcase heater. The crankcase heater and discharge check valve shall be provided for additional system protection from refrigerant migration during off cycle. The compressor shall

Thermostatic expansion valve shall be manually adjustable, externallyequalized, theremostatic expansion valve (TXV) shall control the flow of liquid refrigerant entering the direct expansion coil. The TXV shall maintain consistent superheat of the refrigerant vapor at the outlet of the evaporator coil over the unit's operating range. The TXV shall prevent liquid refrigerant from returning to the compressor.

Unit shall come factory-provided with electric reheat. Electric reheat shall

be low-watt density 304/304 stainless steel finned-tubular electric reheat.

be serviceable and removable from the front of the unit.

The reheat section shall include UL/CSA recognized safety switches to protect the system from overheating. The electric reheat shall be controlled in two stages. The reheat element shall be accessible from the side of the cabinet. Unit shall come factory-provided with a canister style steam generating numidifier installed in the cooling unit and operated by the Liebert iCOM. It shall be complete with disposable cylinder, all supply and drain valve, steam distributor and electronic control. The need to change the canister

shall be indicated on the Liebert iCOM display. The humidifier is designed

level based on conductivity. A minimum 1 in. air-gap within the humidifier

to operate with water conductivity from 3330 to 670 micoS/cm. System

shall automatically fill and drain as well as maintain the required water

assembly shall prevent backflow of the humidifier supply water. Provide refrigerant piping sized as recommended by equipment manufacturer with foamed plastic insulation on the suction line as

specified in this section.

with circuit breaker, solid-state temperature and humidity control modules. Provided solid-state, unit-mounted control panel with start-stop switch, adjustable humidity set point, and adjustable temperature set point. Refer to the sequence of operation. Microprocessor controls shall be capable of relaying unit operating conditions and alarms to remote monitoring system

Control System: Unit-mounted panel with contactors, control transformer

PARAGON STAR

LOT 20 - HUB

3151 NW PARAGON PKWY Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET **REVISIONS** ____ _____ ____

____ ____ ____ ____ ____ ____ _____ _____ ____

REGISTRATION



PROJECT TEAM ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

HOERR SCHAUDT /

BSE STRUCTURAL

ENGINEERS

ENGINEERS

HENDERSON

ENGINEERS

BSE STRUCTURAL FOUNDATIONS **ENGINEERS**

STRUCTURAL

ELECTRICAL

PLUMBING HENDERSON **ENGINEERS** HENDERSON MECHANICAL

FIRE PROTECTION HENDERSON CONTRACTOR FOGEL ANDERSON

> **HENDERSON ENGINEERS** 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 **TEL** 913.742.5000 **FAX** 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412

> > EXPIRES 12/31/2021

SHEET TITLE

MECHANICAL

Brazing filler metals: Insulate refrigerant lines with flexible elastomeric insulation, Armeflex or broken by the hangers. contact with heat). be supplied by the HVAC Contractor. Provide supervision and on-job checkout service as required to ensure Provide thermostat control equipment with sufficient communication, the features as indicated: LCD or LED display screen. Adjust temperature setpoint. Display operating mode. Security lockout. Provide thermostat control equipment that shall interface with a BAS by as indicated. Controls, Trane, or equal. Provide wall or duct-mounted humidistat as indicated on the drawings that

<u>Division 23: HEATING, VENTILATING, AND AIR CONDITIONING</u> (CONTUNIED)

- 5. PIPING AND PIPING SPECIALTIES
- REFRIGERANT PIPING AND INSULATION

Copper Tubing: ASTM B280, Type ACR, hard-drawn straight lengths, and soft-annealed coils, seamless copper tubing. Tubing shall be factory cleaned, ready for installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.

Bendable Copper Tubing: ASTM B280, ACR Type L with H55 temper, straight piping lengths as manufactured by Reftekk. Bends shall be made by factory trained personnel using tools approved by the manufacturer. End connections shall be made using brazing rings composed of 15% silver, 5% phosphorous and remainder copper. Tubing shall be factory cleaned, ready for installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.

Refrigerant Line Kits: Soft-annealed copper tubing with pipe diameters as recommended by the manufacturer and of length as required for the installation. Tubing shall be factory or field insulated with flexible unicellular insulation with thickness as specified below.

Fittings: wrought-copper fittings: ANSI B16.22, streamlined pattern.

Press fit fittings as manufactured by Rapid Locking System (Zoomlock) are an acceptable option to solder or brazed fittings. Fittings shall be approved for use with the copper tubing in the system and be compatible with the refrigerant and oils used in the system. Fittings shall be rated for continuous operating temperature from -40 F to 250 F and maximum operating pressure of 700 psi. Installers shall be trained using manufacturers training tools prior to installing any joints. Prepare the tubing, install fittings to minimum depth and crimp the fitting in accordance with manufacturers instructions. Verify the joint is properly made using crimp gauges or manufacturer's approved verification methods.

Solder filler metals: ASTM B32, 95-5 Tin-Antimony.

1. AWS A5.8, Classification BAg-5: Silver (Ag) 44.0-46.0 percent, Zinc (Z) 23.0-27.0 percent, and Copper (Cu) 29.0-31.0 percent. 2. AWS A5.8, Classification BCuP-5: Phosphorus (P) 4.8-5.2 percent, Silver (Ag) 14.5-15.5 percent, and Copper (Cu) remainder.

Braze mechanical joints. Solder joints connecting to refrigerant valves and specialties. Continuously purge the pipe and fittings during brazing with an inert gas per manufacturer's recommendation (e.g., dry nitrogen) to prevent formation of scale. Maintain purge until the joint is cool to the touch. Provide temporary cap or cover on completed joints with open ends to prevent entry of contaminating materials.

equal. Insulate suction and liquid lines between the expansion valve, evaporator, and compressor with 1/2 inch thick insulation on pipes less than 1 inch in size and 1 inch thick for pipes 1 inch and larger. Insulate hot gas and liquid lines between the compressor condenser, and expansion valve with 1 inch thick insulation on pipes less than 1-1/2 inch and 1-1/2 inch thick for pipes 1-1/2 inch and larger. Piping insulation shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less when tested in accordance with ASTM E84. Coat insulation that is exposed to the elements with a protective sealer. Install and support piping to keep noise and vibration to a minimum. Support and secure piping to Unistrut type supports so that no vibration passes to the building structure. Pipe attachments shall be copper-plated or have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing. Install a support within one foot of each change of direction. Mount pipe hangers around the outside of the insulation with saddles to prevent hangers from rupturing the insulation. Replace insulation that is cut or

Run refrigerant lines parallel and perpendicular to wall and floor lines and to appear straight and in good order. Pitch suction lines down slightly (1 inch in 20 feet) towards the compressor. Provide oil traps at the base of vertical suction risers over 6 feet high. Install liquid line sight glasses in liquid lines nearest the expansion valve. Factory mount expansion valves with the sensing bulbs shipped loose. Field mount expansion valve bulb after refrigerant piping is complete (damage may occur if bulbs come in

For systems of 5 ton capacity and smaller, the contractor shall have the option to provide copper refrigerant tubing line set sized as recommended by equipment manufacturer and of length as required for the installation. Provide quick-connect flare tubing compression fittings, solder connections, or brazed connections as recommended by the manufacturer to match the connections of the condensing unit and evaporator coil.

B. SYSTEM EVACUATION AND CHARGING

Blow out refrigeration lines with dry nitrogen at a suitable pressure before making final connection at the condensing unit or coil to ensure against dirt, scale, or other foreign material being in the lines. Draw a vacuum to 29 inches of mercury. Break this vacuum by charging dry refrigerant gas into the system, raising the pressure to 0 PSIG. Repeat the latter two steps for a triple evacuation before the final evacuation is started. Make final evacuation by reducing the system absolute pressure to a maximum of 0.5 millimeters (500 microns) and allowing the pump to run at this pressure for a minimum of two hours.

Repeat the proper amount of refrigerant charge per the manufacturer's recommendations. Record the amount of refrigerant by weight charged into the system for each circuit recorded to the nearest 1/4 pound on tags and attach tags to the liquid line near the condensing unit. Refrigerant shall

TEMPERATURE CONTROLS

A. GENERAL REQUIREMENTS

Provide a complete temperature control system including control panels, controllers, control power transformers, thermostats, sensors, time switches, override timers, actuators, relays, and wiring as required to control the systems as specified on the drawings.

Submit shop drawings of equipment provided for temperature control. Submit operation and maintenance data, including trouble-shooting maintenance guide, step-by-step procedures indexed for each controller and thermostat function, inspection period, cleaning methods and materials, and calibration tolerances.

Provide integrated wiring diagrams showing interconnections between field-installed equipment and package wiring furnished with the HVAC equipment. Control wiring shall be sized to accommodate the voltage drop associated with the distance between the control device and the controller.

that installation and operation of the temperature control system meets requirements of the drawings, specifications, and sequences of operation. The system shall be guaranteed for a period of one year following the acceptance of the system by the Architect/Engineer. Correct defects occurring during this period at no additional cost to the Owner.

Install control devices with top of device at 48 inches AFF to meet ADA requirements unless otherwise noted on the plans.

B. THERMOSTAT CONTROL EQUIPMENT

programming, input and output connections, and modulating or staging capability to meet the sequence of operations. Provide thermostats with

Button or touchscreen interface.

Display temperature. Display temperature setpoint.

Limit temperature setpoint adjustment within plus or minus 3

Adjust operating mode.

is compatible with the thermostat.

Adjust schedule, minimum seven day occupied/unoccupied. Insulated backing for exterior wall mounting.

At contractor's option where multiple sensors are shown, the sensors may be provided with the thermostat in a single device.

Automated Logic, Delta Controls, Honeywell, Johnson Controls, KMC Controls, Schneider Electric, Siemens, or Trane with quality and features Provide programmable thermostats or controllers with wall module

interfaces that shall control non-packaged equipment requiring customized controls per the sequence of operations by Automated Logic, Delta Controls, Honeywell, Johnson Controls, Schneider Electric, Siemens, or Trane with quality and features as indicated. Include additional controllers and sensors as required for economizer operation.

Provide programmable thermostats that shall control packaged equipment by the packaged equipment manufacturer or Honeywell, Johnson

Provide non-programmable thermostats for on/off operation by the equipment manufacturer or Honeywell, Johnson Controls, Trane, or equal.

Provide economizer controllers for equipment specified to include economizer in its sequence of operation but is not factory furnished with economizer controls included. Economizer controller shall be Honeywell YW7220 Jade Economizer module kit or equal. Economizer module kit shall include the economizer logic module, damper actuator, and sensors of type required to implement the type of economizer scheduled on the

C. SENSORS AND RELAYS

Manufacturers and model numbers are listed for reference as to quality and features required for the sensors and relays. Provide generalpurpose type sensing elements for use in input and output sensors. Provide transmitters or transducers with sensor as required, compatible with the controllers used, with range suitable for the systems encountered. Transmitters and transducers shall have offset and span adjustments, temperature compensation, shock and vibration immunity, and zeroing capability. Accuracy requirements shall include the combined effects of linearity, hysteresis, repeatability, and the transmitter.

Provide sensors that meet the following minimum performance: Dry-bulb temperature sensors at a minimum shall be accurate to +/- 2 degrees Fahrenheit over the range of 40 to 80 degrees Fahrenheit. Wet-bulb temperature shall be calculated using dry-bulb temperature and humidity and shall be accurate to +/- 2 degrees Fahrenheit.

3. Enthalpy shall be calculated using dry-bulb temperature and humidity and shall be accurate to +/- 3 BTU/lb over the range of 20 to 36 4. Humidity sensors at a minimum shall be accurate within +/- 3 percent full range between 20 and 95 percent, with drift less than 1

percent full scale per year. Pressure transmitters at a minimum shall be accurate to +/- 1 percent full scale with drift less than 1 percent full scale per year. Carbon dioxide (CO2) sensors shall measure total percentage of CO2 in ppm. Sensor shall have an accuracy of plus/minus 75 ppm at a 600 and 1000 ppm concentration and certified by the manufacturer to require calibration no more frequently than once every 5 years.

Provide 24 Volt or 120 Volt timeswitches Intermatic Series FM1D20 or equal programmable type with 7-day programming with up to two "ons" and "offs" per day. Battery backup shall provide 48 hours of memory retention. Override timer switches shall be spring wound, 6-hour, normally open type. Coordinate 120 V wiring of timeswitch with electrical contractor if 120 V model is provided.

Provide relays with contact rating, configuration, and coil voltage that is suitable for the application. Relay shall be general purpose, enclosed plugin type and protected by a heat and shock resistant duct cover. Number of contacts and operational function shall be as required. Transient suppression shall be provided as an integral part of the relay. Contactors shall be single coil, electrically operated, mechanically held, double-break, silver-to-silver type protected by arcing contacts. Positive locking shall be obtained without the use of hooks, latches, or semi-permanent magnets. Operating and release times shall be 100 milliseconds or less.

WIRING

Provide electrical and control wiring as specified under the section "Electrical Wiring."

- SEQUENCE OF OPERATION
- A. ROOFTOP UNIT CONTROL
- Reference the Rooftop Unit Control Matrix for sequence of operations. B. EXHAUST FAN CONTROL
- Interlock fan operation with the wall switch.

C. COMPUTER ROOM AIR CONDITIONING UNIT CONTROL

Operate computer room air conditiong unit supply fan continuously. Cycle stages(s) of DX cooling and electric heating coil to maintain thermostat set point (73 degrees Fahrenheit cooling, 68 degrees Fahrenheit heating). Cycle humidifier operation to maintain humidification set point (60% RH).

Auto-changeover panel shall dictate unit operation, operating in lead-lag configuration.

- 8. ALTERNATES
- A. DESCRIPTION

Refer to the architectural portion of the specification for list of alternates. Applicable sections of the base specifications shall apply to all work required by the alternate unless otherwise specified. Determine whether or not and how each alternate affects work. Include labor, materials, equipment, and transportation services necessary for and incidental to the completion of work under each particular alternate. Furnish separate bid for each alternate applicable to work, stating the amount to be added or

END OF SECTION 23

deducted from the base bid.



LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET REVISIONS

____ ____ ____ ____ ____

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT

ARCHITECTURE

HENDERSON

GBA

HOERR SCHAUDT / LANDSCAPE FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

STRUCTURAL BSE STRUCTURAL **ENGINEERS**

PLUMBING

CIVIL

ENGINEERS MECHANICAL HENDERSON

HENDERSON ELECTRICAL **ENGINEERS**

FIRE PROTECTION HENDERSON CONTRACTOR FOGEL ANDERSON

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412

EXPIRES 12/31/2021

SHEET TITLE

MECHANICAL



PLUMBING SYMBOLS				
THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABE	REVIATIONS ARE USED.			V2.02
STANDARD MOUNTING HEIGHTS	PIPING SYMBOLS		PIPING LINETYPES	3
CLINIC SERVICE SINKS (RIM) 30"	OX'	YGEN OUTLET	CW	DOMESTIC COLD WATER (CW)
HOSE BIBB (CENTERLINE) 36"	——■ NIT	ROUS OXIDE OUTLET	SCW	SOFTENED COLD WATER (SCW)
ICE MAKER OUTLET BOX (CENTER OF BOX) 24"	——→ MEI	DICAL AIR OUTLET	HW	DOMESTIC HOT WATER (HW)
JANITOR'S SINK FAUCET FITTINGS (CENTERLINE) 42"	→ NIT	ROGEN OUTLET	HWR	DOMESTIC HOT WATER RECIRC. (HWR)
LAVATORY OR SINK STANDARD HEIGHT (RIM) 31"		DICAL VACUUM INLET	140°	DOMESTIC HOT WATER (140°)
ADA ACCESSIBLE (RIM) 34" CHILD HEIGHT (RIM) 24"		OOR SINK (FS), SIZE & TYPE	T	TRAP PRIMER LINE (T)
NON FREEZE WALL HYDRANT (AFG TO CENTERLINE) 18"		DOR DRAIN (FD), SIZE & TYPE	s	SOIL PIPING - ABOVE FLOOR (S)
SHOWER HEAD		OF DRAIN (RD), SIZE & TYPE		SOIL PIPING - BELOW FLOOR (S)
MEN (CENTERLINE) 78" WOMEN (CENTERLINE) 72"		LL VALVE NTROL VALVE		WASTE PIPING - ABOVE FLOOR (W) WASTE PIPING - BELOW FLOOR (W)
SHOWER VALVE		UTOFF VALVE		GREASE WASTE - ABOVE FLOOR (GW)
STANDARD HEIGHT - MEN (CENTERLINE) 48" STANDARD HEIGHT - WOMEN (CENTERLINE) 42"		ECK VALVE	— — GW — —	GREASE WASTE - BELOW FLOOR (GW)
ADA ACCESSIBLE (CENTERLINE) 38" TO 48"		LANCING VALVE WITH PRESSURE PORTS	CGWV	COMBINATION GREASE WASTE AND VENT (CGWV)
SURGEON'S SCRUB-UP SINK (FRONT RIM) 35" TUB VALVE	_	TER METER	cwv	COMBINATION WASTE AND VENT (CWV)
STANDARD HEIGHT (CENTERLINE) ADA ACCESSIBLE CENTER BETWEEN GRAB BAR AND TUB RIM	STF	RAINER	st	STORM DRAIN - ABOVE FLOOR (ST)
URINAL	STF	RAINER WITH BLOWOFF	— — ·st· — —	STORM DRAIN - BELOW FLOOR (ST)
STANDARD HEIGHT (RIM) 24" ADA ACCESSIBLE (RIM) 17"	REL	LIEF/SAFETY VALVE	OST	OVERFLOW STORM DRAIN - ABOVE FLOOR (OST)
CHILD HEIGHT (RIM) 14"	SOI	LENOID VALVE	— — VBG — —	VENT BELOW GRADE (VBG)
WASHING MACHINE OUTLET BOX (RIM) 42"	PRE	ESSURE REDUCING VALVE	— — VBF — —	VENT BELOW FLOOR (VBF)
WATER CLOSET STANDARD HEIGHT (RIM) 15"	GAS	S PRESSURE REGULATOR	ID	INDIRECT DRAIN (ID)
ADA ACCESSIBLE (TOP OF SEAT) CHILD HEIGHT (RIM) 15 17" TO 19" 10"	─────────────────────────────────────	ERMOSTATIC MIXING VALVE	——CDH——	CONDENSATE DRAIN - HIGH EFFICIENCY RTU (CDH)
WATER COOLER OR DRINKING FOUNTAIN		PE ANCHOR	CD	CONDENSATE DRAIN (CD)
STANDARD HEIGHT (SPOUT) ADA ACCESSIBLE (SPOUT) 41" 36"	EXF	PANSION JOINT	——————————————————————————————————————	AUXILIARY CONDENSATE DRAIN (ACD)
CHILD HEIGHT (SPOUT) 30	BAC	CKFLOW PREVENTER	——————————————————————————————————————	SUMP OR SEWAGE PUMP DISCHARGE (SPD)
	PRE	ESSURE GAUGE	———G———	NATURAL GAS (G)
NSTALL PLUMBING FIXTURES AT THE MOUNTING HEIGHTS SHOWN ABOVE		ERMOMETER	— — -G- — —	NATURAL GAS ON ROOF (G)
JNO IN THE ARCHITECTURAL DRAWINGS OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS. FINAL APPROVAL OF LOCATIONS BY	———— UNI	ION	MPG	MEDIUM PRESSURE NATURAL GAS (MPG)
ARCHITECT. MOUNTING HEIGHTS LISTED ABOVE, OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS, ARE AFF, UNO. ALL DEVICES SHALL BE	FLA	ANGE CONNECTION	— — MPG — —	MEDIUM PRESSURE NATURAL GAS ON ROOF (MPG)
NSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.	———— HOS	SE BIBB (HB)	NPW	NON-POTABLE WATER (NPW)
	 NOI	N-FREEZING WALL HYDRANT (NW)	———LPG———	LIQUEFIED PETROLEUM GAS (LPG)
ANNOTATION		NUAL / AUTOMATIC AIR VENT OR VACUUM RELIEF	WS	WATER SERVICE (WS)
1 PLUMBING PLAN NOTE CALLOUT	VAL P DDS		———DFP———	FIRE PROTECTION SPRINKLER DRY (DFP)
PLUMBING EQUIPMENT DESIGNATION. (CONTRACTOR		ESSURE / VACUUM SWITCH	———FP———	FIRE PROTECTION SPRINKLER WET (FP)
1 FURNISHED AND INSTALLED). REFER TO PLUMBING FIXTURE OR EQUIPMENT SCHEDULES		EANOUT	———DSP———	FIRE PROTECTION STANDPIPE DRY (DSP)
			WSP	FIRE PROTECTION STANDPIPE WET (WSP)
EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR INSTALLED)		ALL CLEANOUT (WCO)	PD	CONDENSATE PUMP DISCHARGE (PD)
		DOR CLEANOUT (FCO)	V	VENT PIPING (V)
CU MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)	_	TERIOR CLEANOUT (ECO) BOW UP	———AW———	ACID WASTE - ABOVE FLOOR (AW)
			— — AW — —	ACID WASTE - BELOW FLOOR (AW)
CONNECTION POINT OF NEW WORK TO EXISTING		BOW DOWN E UP	———AV———	ACID VENT (AV)
DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL		E DOWN	———GWS———	GRAY WATER (GWS)
NUMBER LOWER NUMBER INDICATES SHEET NUMBER		BOW UP WITH SHUT-OFF VALVE (SOV)	———CA———	COMPRESSED AIR (CA)
1 SECTION CUT DESIGNATION		BOW DOWN WITH SHUT-OFF VALVE (SOV)	———MA———	MEDICAL AIR (MA)
		E UP WITH SHUT-OFF VALVE (SOV)	MV	MEDICAL VACUUM (VE)
DEDICATED EQUIPMENT ACCESS TILE		E DOWN WITH SHUT OFF VALVE (SOV)	———НЕ	HELIUM (HE)
ACCESS PANEL	"^"	TER HAMMER ARRESTER (WHA) WITH PDI SIZES,	———IA———	INSTRUMENT AIR (IA)
	VVA	B, C, D, & E)	IV	INSTRUMENT VACUUM (IV)
ABBREVIATIONS	REC	CIRCULATION PUMP	N2	NITROGEN (N2)
ADA AMERICANS WITH MIN MINIMUM DISABILITIES ACT N/C NORMALLY CLOSED	——∞ P-T	RAP	N2O	NITROUS OXIDE (N20)
AFF ABOVE FINISHED FLOOR N/O NORMALLY OPEN AFG ABOVE FINISHED GRADE NIC NOT IN CONTRACT		SCOCK	O2	OXYGEN (O2)
ABOVE TIMISTIED GRADE NOT IN CONTRACT APPLICATION OF THE CONTRACT ORD OVERFLOW ROOF DRAIN PDI PLUMBING DRAINAGE	−−−− TRA	AP PRIMER	EV	EVAC/WAGD (EV)
AS BUILDING AUTOMATION INSTITUTE SYSTEM PH/Ø PHASE	TRA	AP PRIMER WITH DISTRIBUTION UNIT	———CO2———	CARBON DIOXIDE (CO2)
FF BELOW FINISHED FLOOR PRV PRESSURE REDUCING FG BELOW FINISHED GRADE VALVE			——————————————————————————————————————	MEDICAL AIR INTAKE (AI)
BOS BOTTOM OF STRUCTURE RCP REINFORCED CONCRETE			VE	MEDICAL VACUUM EXHAUST (VE)
BOTTOM OF STRUCTURE ROLL ROLL REINFORGED CONCRETE THE BRITISH THERMAL UNIT PIPE TO CONDENSATE PUMP RD ROOF DRAIN			———DA———	DENTAL AIR (DA)
CPVC CHLORINATED POLYVINYL RPM REVOLUTIONS PER CHLORIDE MINUTE			———DV———	DENTAL VACUUM (DV)
CU COPPER RTU ROOFTOP UNIT OI DUCTILE IRON SF SQUARE FEET			——FW1——	FILTERED WATER (FW1)
N DOWN SP SUMP FU DRAINAGE FIXTURE UNIT SS STAINLESS STEEL			——FW2——	FILTERED WATER W/ SCALE INHIBITOR (FW2)
S DOWNSPOUT SANITARY SEWER, SOIL E) EXISTING STACK			———RO———	REVERSE OSMOSIS (RO)
MS ENERGY MANAGEMENT TDH TOTAL DYNAMIC HEAD SYSTEM TFA TO FLOOR ABOVE			——ROR——	REVERSE OSMOSIS REMINERALIZATION (ROR)
TR EXISTING TO REMAIN TFB TO FLOOR BELOW WC ELECTRIC WATER COOLER TYP TYPICAL	LINETYPE LEGEND			
D FLOOR DRAIN FA FROM FLOOR ABOVE FB FROM FLOOR BELOW FF FINISHED FLOOR CL FLOW LINE LA FULL LOAD AMPS LR FLOOR SPM GALLONS PER MINUTE ID HEAD, HUB DRAIN UL UNDERWRITERS LABORATORIES, INC. UNO UNLESS NOTED OTHERWISE UPS UNINTERRUPTIBLE POWER SUPPLY VCP VITRIFIED CLAY PIPE VFD VARIABLE FREQUENCY DRIVE	COMBINATION WITH THE SYMEXISTING, TO BE DEMOLISHE AND/OR ITEMS WHICH ARE A THE STATUS OF ITEMS USING VIEW IN WHICH THEY APPEAR INTENDED TO FULLY DESCRIUNHICH IS DETERMINED BY THE	GS DIFFERENT LINETYPES ARE USED IN MBOLS TO INDICATE THE STATUS OF ITEMS AS ED, TO BE INCLUDED AS PART OF NEW WORK INTICIPATED TO BE PROVIDED IN THE FUTURE. G THESE LINETYPES ARE RELATIVE TO THE R. PHASING SHOWN IN DRAWINGS IS NOT IBE ALL NECESSARY CONSTRUCTION PHASING, HE CONTRACTOR AS PART OF THEIR		
IZ HERTZ VS VENT STACK E INVERT ELEVATION VTR VENT THROUGH ROOF	DOCUMENTS ARE GENERAL	H PHASES DESCRIBED IN THE CONSTRUCTION AND ONLY INTENDED TO INDICATE A BROAD ESCRIBING THE PROJECT. THE FOLLOWING	CALL OUTS	
N WC INCHES OF WATER COLUMN W/ WITH JB JUNCTION BOX W/O WITHOUT LBOY JUNCTION BOY WC WATER COLUMN		ESCRIBING THE PROJECT. THE FOLLOWING I ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE,	ENLARGED PLAN CALLO	UT T
J-BOX JUNCTION BOX WC WATER COLUMN KW KILOWATT WS WASTE STACK MAU MAKE-UP AIR UNIT WSFU WATER SUPPLY FIXTURE	LIU.			
MAX MAXIMUM UNIT MBH 1000 BTU PER HOUR WVS WASTE VENT STACK	EXISTING	NEW ————	NOT IN SCOPE	
MH MANHOLE	DEMOLISH — — —	FUTURE		

GENERAL NOTES:

- 1. PROVIDE A CONSTRUCTION RECORD SET OF "AS-BUILT" DOCUMENTS TO THE ARCHITECT REFLECTING ANY VARIANCES OF INSTALLED PIPING LOCATIONS OR EQUIPMENT CONTRARY TO THE CONSTRUCTION DOCUMENTS, REFER TO SPECIFICATIONS.
- 2. DRAWINGS ARE DIAGRAMMATIC ONLY AND REPRESENT THE GENERAL SCOPE OF THE WORK. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND PLANS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY THE ARCHITECT OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 3. PROVIDE TO THE ARCHITECT A COPY OF INSPECTION REPORTS AND APPROVAL CERTIFICATES FROM LOCAL AND STATE INSPECTIONS, REFER TO SPECIFICATIONS.
- 4. INSTALLATION SHALL COMPLY WITH LEGALLY CONSTITUTED CODES AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.
- 5. PLANS AND SPECIFICATIONS GOVERN WHERE THEY EXCEED CODE REQUIREMENTS.
- 6. VERIFY LOCATION AND DEPTH OF UTILITIES AT POINTS OF CONNECTION BEFORE START OF PIPING INSTALLATION.

LOCATION OF PIPE ROUTING.

- 7. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION AND
- MOUNTING HEIGHTS OF PLUMBING FIXTURES. 8. DO NOT SCALE FLOOR PLANS FOR EXACT HORIZONTAL
- 9. INSTALL CONCEALED PIPING TIGHT TO THE STRUCTURE AND
- AS HIGH AS POSSIBLE. 10. VALVES SHALL BE LINE SIZE UNLESS OTHERWISE NOTED.
- 11. INSTALL EXPOSED PIPING, WHERE NECESSARY, IN FINISHED AREAS TIGHT TO THE STRUCTURE, WALL OR CEILING AND AS HIGH AS POSSIBLE. INSTALL PIPING PARALLEL AND / OR PERPENDICULAR TO WALLS.
- 12. INSTALL VALVES AND APPURTENANCES A MAXIMUM OF 24" ABOVE CEILING IN ACCESSIBLE LOCATION WITHIN 24" OF ACCESS DOORS OR ACCESSIBLE CEILING TILES. PROVIDE PIPE AND FITTINGS TO INSTALL VALVES AND APPURTENANCES AT REQUIRED HEIGHT AND WITHIN 24" OF ACCESS DOORS OR ACCESSIBLE CEILING TILES.
- 13. INSTALL NO PLASTIC PIPE IN THE CEILING RETURN AIR
- 14. COORDINATE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
- 15. COORDINATE PIPING INSTALLATION WITH STRUCTURAL GRADE BEAMS, FOOTINGS, COLUMN PIERS, ETC. SLEEVE PIPING THROUGH GRADE BEAMS, FOOTING, ETC. WHERE REQUIRED AND AS NOTED ON PLANS. COORDINATE SLEEVE INSTALLATIONS WITH THE ARCHITECT, STRUCTURAL ENGINEER, STRUCTURAL CONTRACTOR AND GENERAL CONTRACTOR BEFORE CONCRETE IS INSTALLED.
- 16. CLEAN FAUCET AERATORS AND PIPE STRAINERS PRIOR TO TURNING BUILDING OVER TO THE OWNER.
- 17. PROVIDE TRAP PRIMERS WHERE REQUIRED BY LOCAL AUTHORITIES.

WITH THE ARCHITECT AND / OR OWNER.

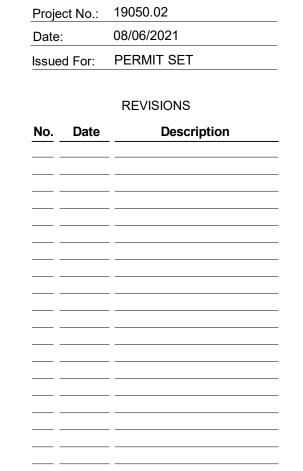
- 18. COORDINATE PIPE ROUTING AWAY FROM ELECTRICAL PANELS. DO NOT INSTALL PIPING OVER ELECTRICAL PANELS.
- 19. PAINT ALL EXPOSED GAS AND WATER PIPING USING RUST INHIBITOR PAINT. PAINT AND COLOR SHALL BE COORDINATED
- 20. COORDINATE ALL ROOF PENETRATIONS WITH OTHER TRADES. MAINTAIN 10' MINIMUM CLEARANCE FROM ALL AIR INTAKES.
- MAINTAIN 2' CLEARANCE FROM ALL OTHER EQUIPMENT. 21. INSULATE PIPING ROUTED IN EXTERIOR BUILDING WALLS WITH
- MINIMUM 2" BATT INSULATION TO PREVENT FREEZING. 22. PROVIDE "HEAVY-DUTY" NO-HUB COUPLINGS ON STORM
- PIPING, INCLUDING CONNECTIONS TO ROOF DRAINS AND SANITARY PIPING 3" AND LARGER. SEE DIVISION 22 SPECIFICATIONS FOR MORE INFORMATION.
- 23. PROVIDE "HEAVY-DUTY" NO-HUB COUPLINGS ON SANITARY PIPING 3" AND LARGER. SEE DIVISION 22 SPECIFICATIONS FOR MORE INFORMATION.
- OF PVC DWV TO CAST IRON AT SLAB ON GRADE. SEE DIVISION 22 SPECIFICATION FOR MORE INFORMATION.

24. PROVIDE TRANSITION ADAPTER COUPLINGS FOR CONNECTION

- 25. FLOW CONTROL VALVES SHALL BE SIZE 1/2" AND SET AT 0.5 GPM UNLESS NOTED OTHERWISE.
- 26. WATER HAMMER ARRESTORS SHALL BE SIZE "A" UNLESS NOTED OTHERWISE.
- 27. PROVIDE VERTICAL LIFT SPRING LOADED CHECK VALVES IN HOT AND COLD WATER SUPPLIES FOR MOP SINK FAUCETS DOWNSTREAM OF SHUTOFF VALVES.
- 28. PROVIDE SIZE AND LENGTH OF HOT WATER FIXTURE SUPPLY PIPE FROM CIRCULATED HOT WATER BRANCH OR MAIN TO TERMINATION OF HOT WATER FIXTURE SUPPLY PIPE AT EACH FIXTURE PER 2015 INTERNATIONAL ENERGY CONSERVATION CODE, TABLE C404.3.1. FOR ½" HOT WATER FIXTURE SUPPLY PIPE SIZE TO INDIVIDUAL LAVATORIES. PROVIDE MAXIMUM LENGTH OF TWO FEET. FOR 1/2" HOT WATER FIXTURE SUPPLY PIPE SIZE TO INDIVIDUAL SINKS, PROVIDE MAXIMUM LENGTH OF 43 FEET. FOR 3/4" HOT WATER FIXTURE SUPPLY PIPE SIZE TO INDIVIDUAL SINKS, PROVIDE MAXIMUM LENGTH OF 21 FEET.



3151 NW PARAGON PKWY



REGISTRATION



PROJECT TEAM

BRADLEY E. CHAMBON LICENSE # 028603

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL GBA LANDSCAPE HOERR SCHAUDT / FOUNDATIONS BSE STRUCTURAL **ENGINEERS BSE STRUCTURAL** STRUCTURAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON **ENGINEERS** HENDERSON ELECTRICAL **ENGINEERS** FIRE PROTECTION HENDERSON

> HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412 EXPIRES 12/31/2021

CONTRACTOR FOGEL ANDERSON

SHEET TITLE **PLUMBING GENERAL** NOTES AND LEGEND



3151 NW PARAGON PKWY

Project No.: 19050.02

Date: 08/06/2021

Issued For: PERMIT SET

REVISIONS

No. Date Description

REGISTRATION



08/06/20 BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / LAND3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTURAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR FOGEL ANDERSON

HENDERSON
ENGINEERS

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1850004412

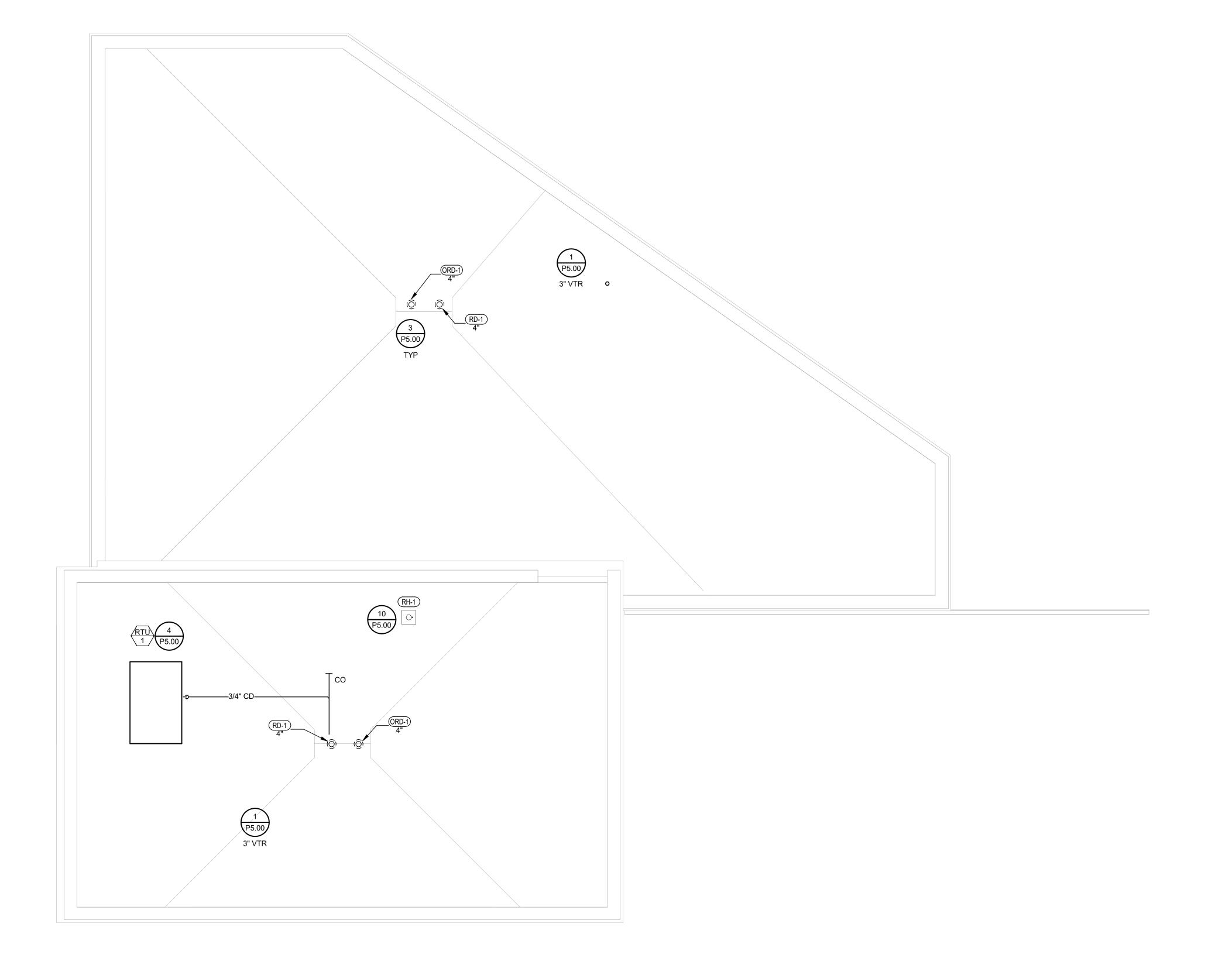
EXPIRES 12/31/2021

SHEET TITLE

PLUMBING ROOF PLAN

SHEET NUMBER

P1.0





- DISCHARGE T&P RELIEF OVER MOP SINK WITH AHJ APPROVED AIR GAP.
- 2 DO NOT INSTALL PLUMBING PIPING OVER ELECTRICAL
- PANELS OR EQUIPMENT.

 3 ROUTE 3/4" CD LINE FROM UNIT OUTLET TO NEARBY WALL, DROP TO 6" AFF, TURN AND RUN TO FLOOR SINK WITH AIR GAP. SECURE TO WALL AS REQUIRED. UNIT INTERNALLY TRAPPED, DO NOT TRAP CONDENSATE DISCHARGE LINE.



3151 NW PARAGON PKWY

Project No.: 19050.02

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REVISIONS

No. Date Description

REGISTRATION



08/06/20 BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHA

LANDSCAPE HOERR SCHAUDT / LAND3

FOUNDATIONS BSE STRUCTURAL

STRUCTURAL BSE STRUCTURAL ENGINEERS

ENGINEERS

ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR FOGEL ANDERSON

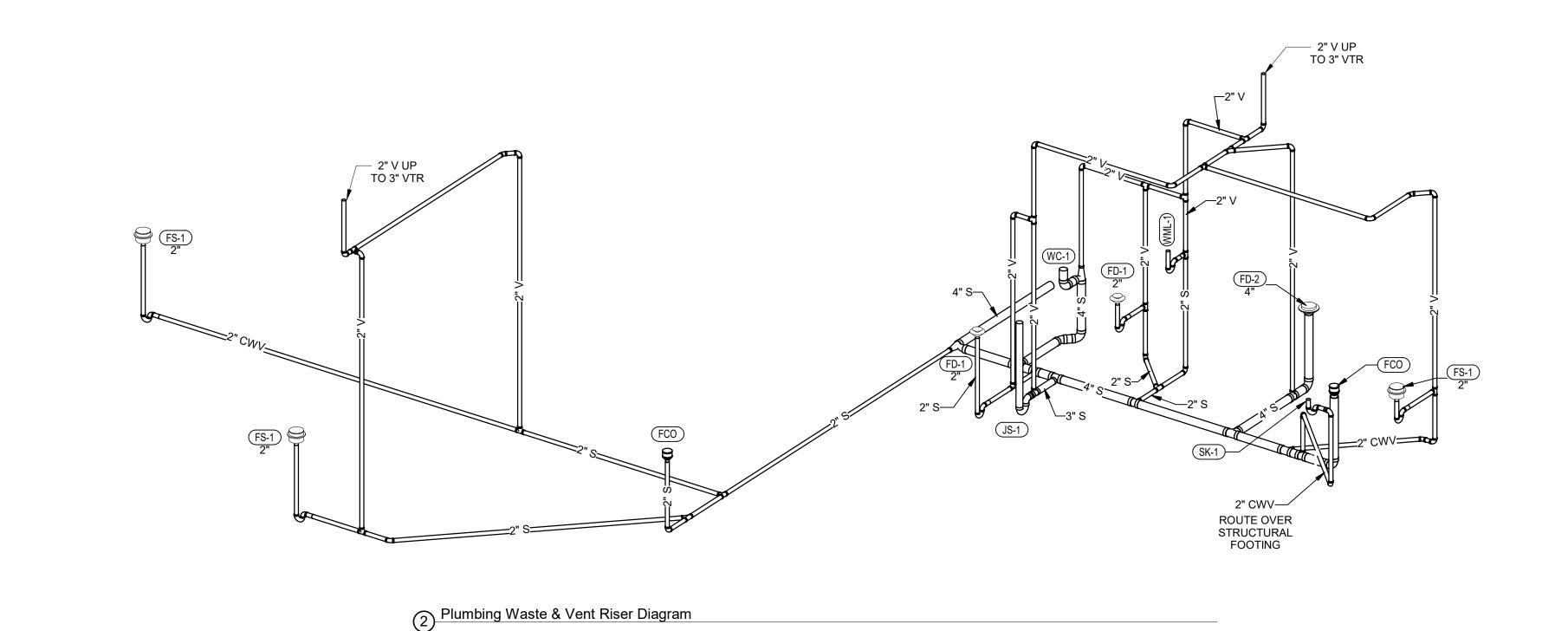
HENDERSON ENGINEERS

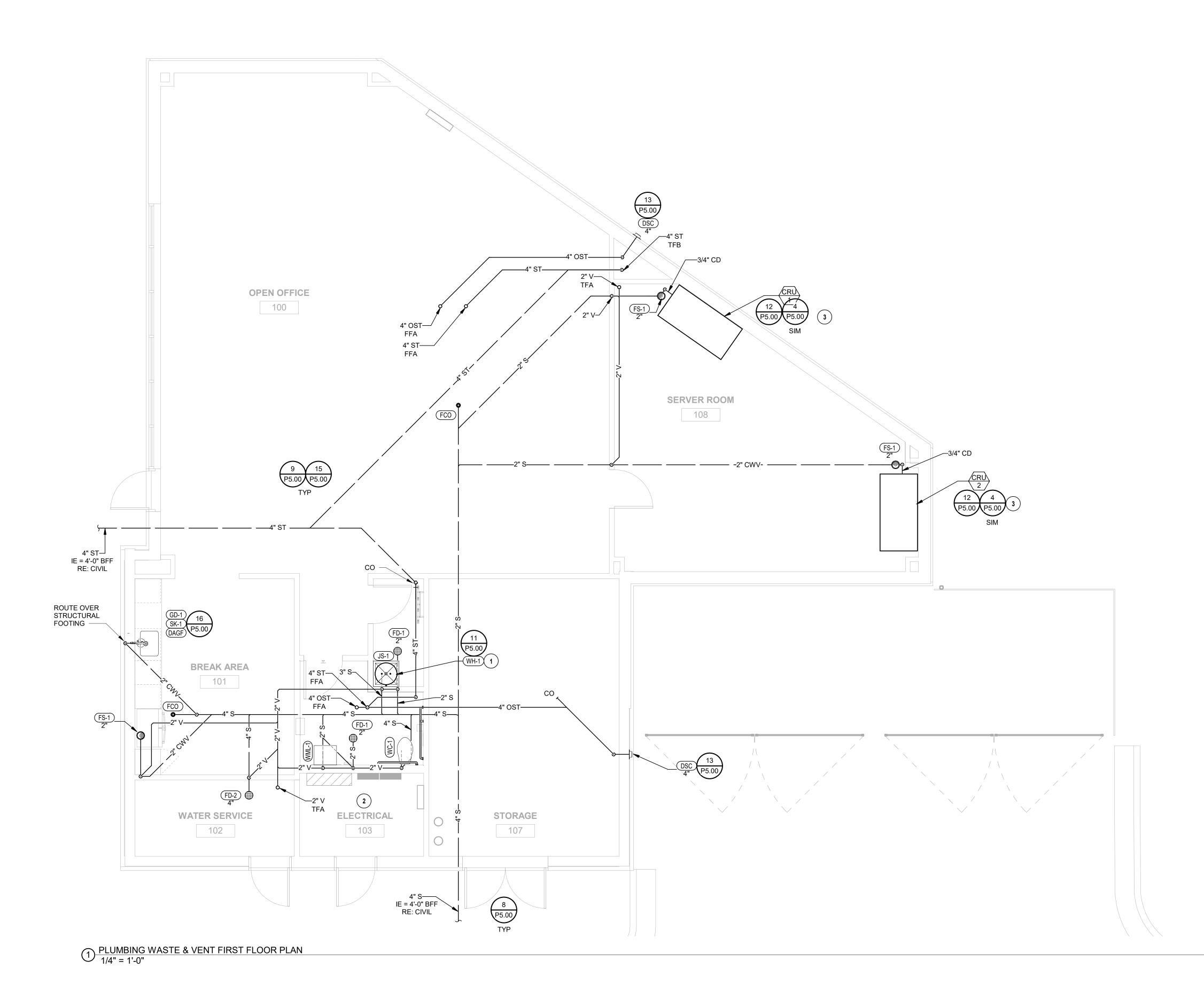
8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412 EXPIRES 12/31/2021

PLUMBING
WASTE & VENT
FIRST FLOOR

PLAN

P2.01





O PLUMBING PLAN NOTES:

- DO NOT INSTALL PLUMBING PIPING OVER ELECTRICAL PANELS OR EQUIPMENT.
 FURNISH TRANSFORMER "T-1" TO ELECTRICAL FOR INSTALLATION ABOVE CEILING IN ACCESSIBLE LOCATION
- URINAL FLUSH VALVES FOR THIS ROOM. PROVIDE LOW VOLTAGE WIRING AS REQUIRED.

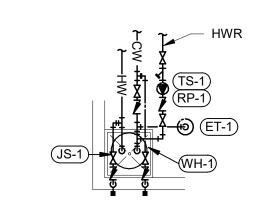
 3 PROVIDE FOR FUTURE BEVERAGE CONNECTION. ROUTE

FOR CONTROL OF WATER CLOSET FLUSH VALVES, AND

- DISCHARGE THRU WALL TO NEARBY FLOOR SINK.

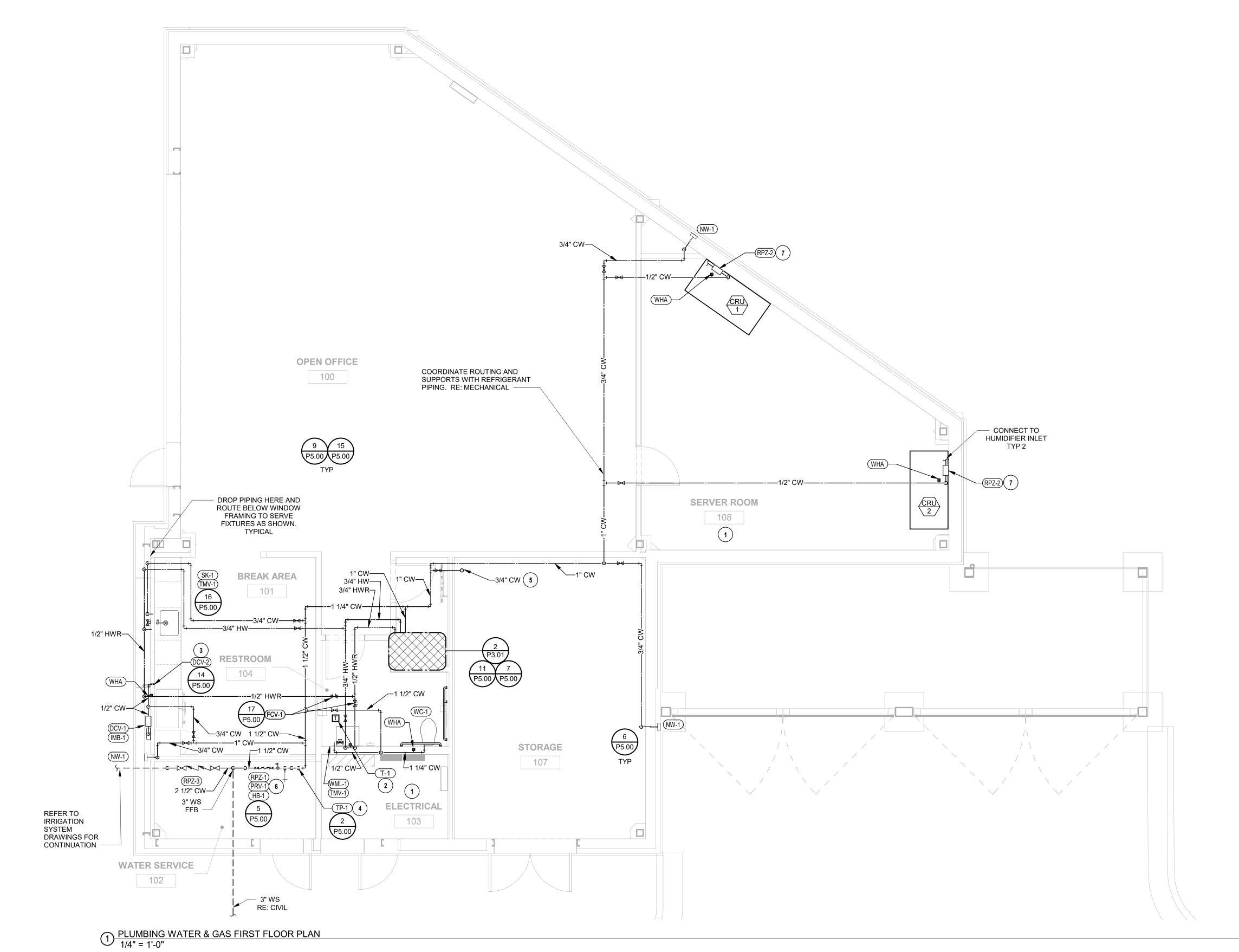
 4 CONNECT TRAP PRIMER TO FD-2. REFER TO 1/P2.01 FOR
- DRAIN LOCATION.

 5 ROUTE CW UP TO ROOF HYDRANT.
- 5 ROUTE CW UP TO ROOF HYDRANT.
 6 ONCE WATER SERVICE MAINS ARE INSTALLED AND PRESSURES AT BUILDING TAP ARE KNOWN, CONTACT EOR OUTLET AND FALLOFF PRESSURES THROUGH PRV.
- 7 AIR GAP FITTING WITH INDIRECT DRAIN TO FLOOR SINK ONE PIPE SIZE LARGER THAN BACKFLOW PREVENTER DRAIN



2 WATER HEATER OVER JANITOR'S SINK PLAN NTS

BASIS OF DESIGN FOR THE DOMESTIC WATER DISTRIBUTION, SIZING, AND PLUMBING FIXTURE SELECTION AS SHOWN IN THESE DOCUMENTS ARE BASED UPON A MINIMUM AVAILABLE WATER SERVICE PRESSURE OF 99 PSI AT THE POINT OF CONNECTION TO THE UTILITY WATER SERVICE PIPING. SHOULD AVAILABLE DOMESTIC WATER PRESSURE BE LESS THAN 99, AT MINIMUM 146 GPM, THEN CONTRACTOR SHALL INFORM ARCHITECT AND ENGINEER FOR ADDITIONAL REVIEW AND DETERMINATION IF A BOOSTER PUMP IS REQUIRED.





LOT 20 - HUB BUILDING

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08/06/203 BRADLEY E. CHAMBON LICENSE # 028603

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ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON

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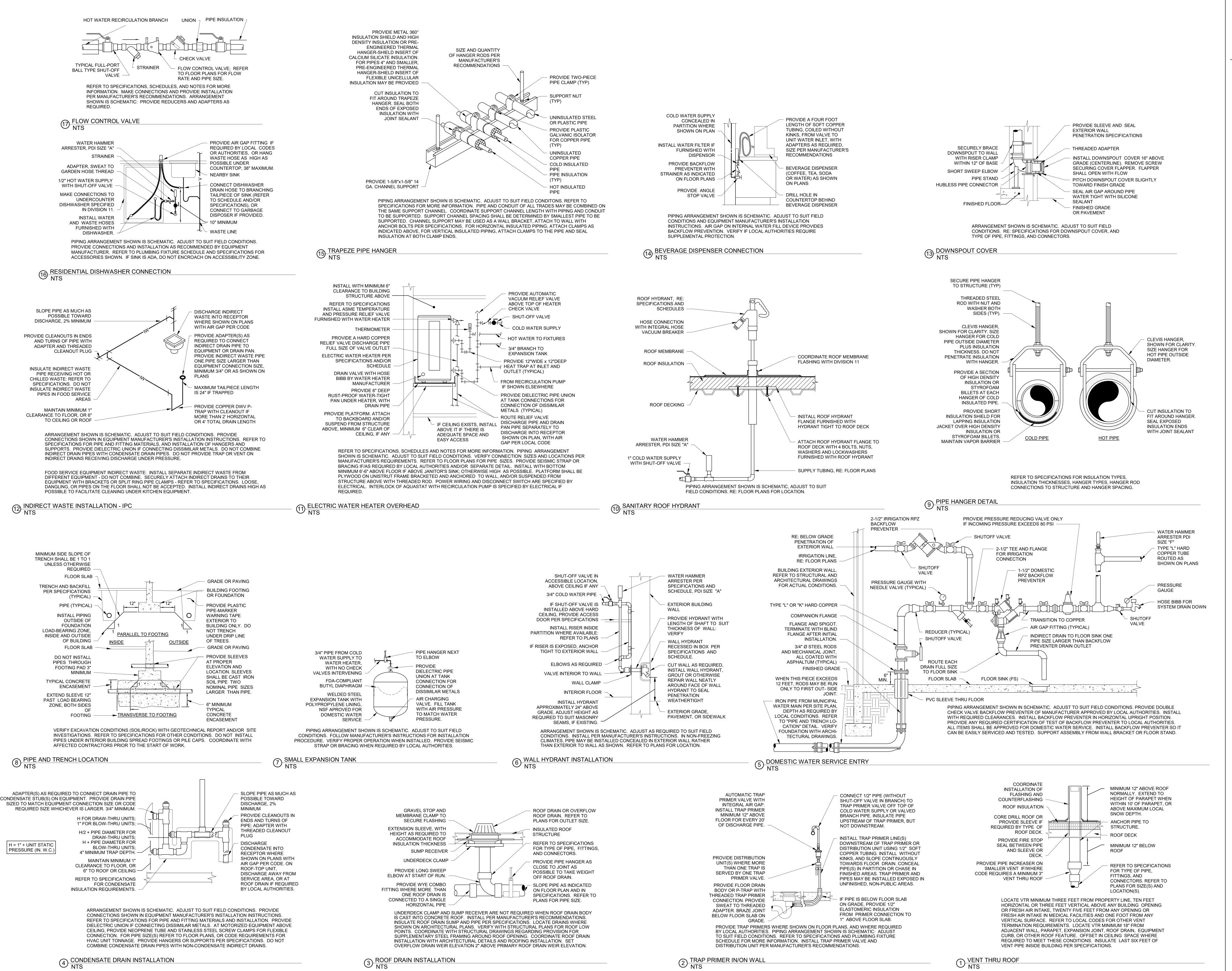
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1850004412 EXPIRES 12/31/2021

PLUMBING
WATER & GAS
FIRST FLOOR
PLAN

P3.01



PARAGON STAR

LOT 20 - HUB

3151 NW PARAGON PKWY

Project No.: 19050.02 Issued For: PERMIT SET

REVISIONS

REGISTRATION

BRADLEY E. CHAMBON

LICENSE # 028603 PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL

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BSE STRUCTURAL FOUNDATIONS **ENGINEERS**

BSE STRUCTURAL STRUCTURAL **ENGINEERS** PLUMBING HENDERSON

ENGINEERS

ENGINEERS HENDERSON

MECHANICAL **ENGINEERS** ELECTRICAL HENDERSON

FIRE PROTECTION HENDERSON **ENGINEERS**

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EXPIRES 12/31/2021

SHEET TITLE

PLUMBING DETAILS

FIXTURE BRANCH CONNECTION SCHEDULE FIXTURE COLD WATER HOT WATER WASTE VENT DRINKING FOUNTAIN 1/2" 2" 2" FLOOR DRAIN 2" 2" 2" JANITOR'S SINK 1/2" 1/2" 3" 2" LAVATORY/HAND SINK 1/2" 1/2" 2" 2" SINK 1/2" 1/2" 2" 2" WATER CLOSET (FLUSH VALVE) 1 1/4" 4" 2"

NOTE: PIPE SIZES SHOWN ARE MINIMUM.

PLUMBING EXPANSION TANK SCHEDULE										
MIN. ACCEPTANCE TANK SIZE VOLUME MARK MANUFACTURER MODEL (GALLONS) (GALLONS) SERVICE WEIGHT NOTES										
ET-1	AMTROL	ST-5	2	0.9	WH-1	22 lb	Α			

A. CHARGE TANK WITH AIR TO IDENTICAL PRESSURE AS STATIC DOMESTIC WATER PRESSURE.

RECIRCULATION PUMP SCHEDULE										
					HEAD	CONNECTION	ELECTF	ELECTRICAL DATA		
MARK	MANUFACTURER	MODEL	LOCATION	GPM	(FT.)	SIZE	VOLTS	PH	HP	NOTES
RP-1	BELL & GOSSETT	NBF-9U	WH-1	1	7	3/4"	120	1	1/18	A, B, C, D

NOTES:

A. ALL LEAD FREE CAST BRONZE BOOSTER.B. PROVIDE WITH STRAINER UPSTREAM OF PUMP.

C. PROVIDE ADJUSTABLE, SURFACE MOUNTED AQUASTAT - HONEYWELL L6006C.
 D. SET AQUASTAT TO SHUT OFF RECIRCULATION PUMP AT WATER HEATER SET POINT AND ON AT 10°F BELOW SET POINT.

Е	ELECTRIC STORAGE WATER HEATER SCHEDULE										
			AREA	TANK SIZE	ELECTRICAL DATA			RECOVERY			
MARK	MANUFACTURER	MODEL#	SERVED	(GALLONS)	VOLTS	PHASE	KW	(GPH)	WEIGHT	NOTES	
WH-1	A.O. SMITH	#DEL-20	BLDG	20	208	1	6	26	241 lb	A, B, C, D	

A. 93°F TEMPERATURE RISE WITH 140°F OPERATING TEMPERATURE

B. DUAL ELEMENT WIRED FOR NON-SIMULTANEOUS OPERATION
C. "LOW BOY" DESIGN
D. PROVIDE WITH A.O. SMITH # 160934 SHELF

PLUMBING FIXTURE SCHEDULE

HEIGHTS.

FIXTURES IN THIS SCHEDULE OR THEIR APPROVED EQUIVALENT ARE PROVIDED BY THE PLUMBING CONTRACTOR. SUBMIT SHOP DRAWINGS ON EACH OF THESE ITEMS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION AND INSTALLATION REQUIREMENTS. VERIFY ROUGH-IN REQUIREMENTS WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE PLUMBING FIXTURE MOUNTING

PLUMBING FIXTURE SCHEDULE

PLAN MARK

DESCRIPTION

DAGF

SIOUX CHIEF # 249, DISHWASHER AIR GAP MEETING ASSE 1021 WITH POLYPROPYLENE BODY, CHROME-PLATED BRASS CAP, 1/2" INLET HOSE BARB, AND 3/4" OUTLET HOSE BARB.

DCV-1

DOUBLE CHECK VALVE BACKFLOW PREVENTER: WATTS # SS007QT, MEETING ASSE 1015, 316 STAINLESS STEEL BODY, QUARTER TURN TEST COCKS, QUARTER TURN, FULL PORT BALL VALVES.

DCV-2

DUAL CHECK VALVE WITH ATMOSPHERIC PORT: WATTS # SD-3, MEETING ASSE 1022 AND NSF 18, 316 STAINLESS STEEL BODY, 3/8" INLET AND

DRAIN WITH AIR GAP.

DSC DOWNSPOUT COVER: JAY R. SMITH # 1775, ROUND FABRICATED STAINLESS STEEL FRAME WITH FABRICATED SECURED PERFORATED STAINLESS STEEL HINGED COVER. PROVIDE OUTLET SIZE AS SHOWN ON

FLOOR CLEANOUT: JAY R. SMITH, CAST IRON BODY, FLASHING FLANGE
WITH CLAMPING COLLAR, ABS PLUG, AND ADJUSTABLE, ROUND, SECURED,
NICKEL BRONZE, TOP. # 4031L (-F-C), SCORIATED TOP FOR EXPOSED,
FLUSH WITH FINISHED FLOOR, APPLICATION(S), # 4031L (-F-C-Y), STAINLESS
STEEL MARKER FOR INSTALLATION IN CARPETED FLOOR AREA(S), # 4151
(-F-C), 1/8" RECESS FOR INSTALLATION IN TILED FLOOR AREA(S), # 4191
(-F-C), 1/2" RECESS FOR INSTALLATION IN TERRAZZO AND SIMILAR POURED
FLOOR AREA(S). REFER TO SPECIFICATIONS FOR INSTALLATION.

OUTLET, ATMOSPHERIC PORT, AND WYE PATTERN STRAINER. PROVIDE 3/4" INDIRECT DRAIN FROM ATMOSPHERIC PORT AND DISCHARGE TO

FCV-1

FLOW CONTROL VALVE: FLOWDESIGN # ICSS "AUTOFLOW", SERIES 300
STAINLESS UNION BODY WITH NICKEL PLATED UNION NUT, STAINLESS
STEEL PRESSURE COMPENSATING CARTRIDGE, MEETING NSF 61 ANNEX G,
NAMEPLATE AND 1/2" VALVE BODY SIZE UNLESS SHOWN OTHERWISE ON
PLANS. PROVIDE 0.5 GPM FLOW RATE CARTRIDGE UNLESS SHOWN
OTHERWISE ON PLANS.

FD-1

FLOOR DRAIN: JAY R .SMITH # 2005L (-A), CAST IRON BODY AND CLAMPING COLLAR, ADJUSTABLE 6" ROUND NICKEL BRONZE STRAINER. USE PUSH-ON JOINT OF OUTLET SIZE AS SHOWN ON PLANS.

TRAP SEAL: PROVIDE TRAP SEAL PER SPECIFICATIONS FOR ACTUAL FLOOR DRAIN MODEL AND SIZE.

FD-2

EQUIPMENT FLOOR DRAIN: JAY R. SMITH # 2220L, CAST IRON BODY, 8-1/2"
ROUND, LOOSE, MEDIUM DUTY, CAST IRON GRATE, SEDIMENT BUCKET,
BOTTOM OUTLET, SEEPAGE PAN, AND MEMBRANE FLASHING CLAMP.
PROVIDE TRAP PRIMER PORT IF TRAP PRIMER IS PROVIDED ON THE
DRAWINGS. USE PUSH-ON JOINT OF OUTLET SIZE AS SHOWN ON PLANS.

FS-1

FLOOR SINK: JAY R. SMITH # 3041C (-12), 6" DEEP CAST IRON BODY WITH
ACID RESISTING ENAMELED INTERIOR, ANCHOR FLANGE WITH SEEPAGE
HOLES, CLAMP COLLAR, WHITE ABS SEDIMENT BUCKET, AND 8-1/2" ROUND
NICKEL BRONZE RIM AND HALF GRATE. USE CAULK JOINT OF OUTLET SIZE
AS SHOWN ON PLANS.
TRAP SEAL: PROVIDE TRAP SEAL PER SPECIFICATIONS FOR ACTUAL

FLOOR DRAIN MODEL AND SIZE.

O-1 GARBAGE DISPOSER: IN-SINK-ERATOR "BADGER 5XP" RESIDENTIAL DISPOSER WITH 3/4 H.P. MOTOR WITH POWER CORD, PLASTIC GRIND CHAMBER, GALVANIZED STEEL CUTTING ELEMENT, PERMANENTLY LUBRICATED UPPER AND LOWER BEARINGS AND SOUND DEADENING

ENCLOSURE.
TRIM: WASTE DISCHARGE KIT AND DISHWASHER TAILPIECE.
ELECTRICAL REQUIREMENTS: 120-VOLT, 8.1 FULL LOAD AMPS.
HOSE BIBB: PRIER PRODUCTS # C-158NP.75, ROUGH CHROME PLATED

BRASS 3/4" FEMALE FIP INLET, 3/4" THREADED HOSE CONNECTION, METAL WHEEL HANDLE, AND ASSE 1011 INTEGRAL VACUUM BREAKER.

IMB-1

ICE MAKER BOX: GUY GRAY MODEL # BIM875, 20 GAUGE GALVANIZED STEEL BOX, 18 GAUGE STEEL FACEPLATE, BOTTOM INLET WATER SUPPLY WITH 1/2" x 1/4" COMPRESSION ANGLE STOP VALVE.

TRIM: LOOP 4 FEET OF 1/4" TYPE "K" SOFT COPPER TUBING.

JANITOR'S SINK: STERN-WILLIAMS # MTB-2424, 24" x 24" x 10" HIGH
TERRAZZO BASIN WITH INTEGRAL STAINLESS STEEL DRAIN BODY.
FAUCET: CHICAGO FAUCET # 897-CP FAUCET WITH WALL BRACE, INTEGRAL
VACUUM BREAKER, PAIL HOOK, AND 3/4" MALE HOSE THREADED OUTLET.
SECURE FAUCET IN WALL WITH BACKBOARD.
TRIM: # BP TYPE 304, 20 GAUGE, STAINLESS STEEL WALL SURROUNDS, #
T-35 THREE FOOT LONG REINFORCED HOSE WITH 3/4" CHROME COUPLING
AND WALL HOOK, # V-70 EXTRUDED VINYL BUMPER GUARD, AND # T-40 24"
STAINLESS STEEL MOP HANGER.

NON-FREEZE WALL HYDRANT: PRIER PRODUCTS # C-634NBX1, SATIN NICKEL PLATED BRASS 1" MALE INLET BY 3/4" FEMALE INLET, 3/4"
THREADED HOSE CONNECTION, LOOSE KEY HANDLE, HYDRANT LENGTH AS REQUIRED FOR INSTALLED WALL THICKNESS, ADJUSTABLE WALL CLAMP, BRASS BOX WITH SATIN NICKEL PLATED FINISH AND INTEGRAL ASSE 1052 DOUBLE CHECK VACUUM BREAKER.

OVERFLOW ROOF DRAIN: JAY R. SMITH # 1080Y (-E0X-C-R-CID), 15"
DIAMETER CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP,
UNDERDECK CLAMP, SUMP RECEIVER, HUBLESS OUTLET, FIXED
EXTENSION – HEIGHT AS REQUIRED BY INSTALLED INSULATION
THICKNESS, CAST IRON DOME BOLTED OR LOCKED DOWN AND 2" HIGH
WATER DAM. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.

PRESSURE REDUCING VALVE: WATTS # LF223, BRONZE BODY, STAINLESS

STEEL SEAT, STAINLESS STEEL BOLTS, INLET AND OUTLET SIZE AS SHOWN ON PLANS, 25 - 75 PSI REDUCED PRESSURE RANGE. SET OUTLET PRESSURE TO XX PSI WITH FLOW RATE OF YY GPM AT A FALL OFF PRESSURE OF ZZ PSI DIFFERENTIAL.

ROOF DRAIN: JAY R. SMITH # 1010Y (-E0X-C-R-CID), 15" DIAMETER CAST

ROOF DRAIN: JAY R. SMITH # 1010Y (-E0X-C-R-CID), 15" DIAMETER CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP, UNDERDECK CLAMP, SUMP RECEIVER, HUBLESS OUTLET, FIXED EXTENSION – HEIGHT AS REQUIRED BY INSTALLED INSULATION THICKNESS, AND CAST IRON DOME BOLTED OR LOCKED DOWN. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.

PLUMBING FIXTURE SCHEDULE

PLUMBING
PLAN MARK

DESCRIPTION

ROOF NON-FREEZE POST HYDRANT: MAPA PRODUCTS # MPH-24FP FREEZE
PROOF POST HYDRANT MEETING ASSE #1057 WITH BLACK POWDER
COATED CAST ALUMINUM WEATHER-GUARD DOME HANDLE, STAINLESS
STEEL SHROUD WITH WELDED STAINLESS STEEL FLANGE, UNDER DECK
CLAMP, BRONZE GLOBE ANGLE VALVE, 3/4" HOSE CONNECTION, QUICK
DISCONNECT WITH BUILT-IN VACUUM BREAKER, STAINLESS STEEL
RESERVOIR.

RPZ-1

REDUCED PRESSURE ZONE BACKFLOW PREVENTER: WATTS # LFU009AQT MEETING ASSE 1013, LEAD FREE CAST BRONZE BODY, QUARTER TURN TEST COCKS, 90°D SWIVEL UNIONS, QUARTER TURN BALL VALVES AND # 909AG AIR GAP FITTING.

RPZ-2 REDUCED PRESSURE ZONE BACKFLOW PREVENTER: WATTS # LF009QT-S, MEETING ASSE 1013, LEAD FREE CAST BRONZE BODY, QUARTER TURN TEST COCKS, QUARTER TURN BALL VALVES, BRONZE STRAINER, AND # 909AG AIR GAP FITTING.

RPZ-3

REDUCED PRESSURE ZONE BACKFLOW PREVENTER: WATTS # 957-NRS, MEETING ASSE 1013, 304 STAINLESS STEEL BODY AND SLEEVE, QUARTER TURN TEST COCKS, RESILIENT SEATED NON-RISING STEM GATE VALVES AND WATTS #77F-DI-FDA EPOXY COATED CAST IRON STRAINER AND # 957AG AIR GAP FITTING.

SK-1

SINK: ELKAY # ELUH211510, 23-1/2" x 18-1/4" x 10" DEEP, SINGLE
COMPARTMENT, SELF-RIMMING, 18 GAUGE 304 STAINLESS STEEL FIXTURE
WITH SATIN FINISH, SOUNDGAURD UNDERCOATING, AND CENTER REAR
DRAIN. SEAL LIP OF SINK TO UNDERSIDE OF COUNTERTOP WITH SILICONE
AND SECURE WITH MANUFACTURER'S MOUNTING BRACKETS.
FAUCET: KOHLER # K-7509 "PURIST", HIGH ARCH GOOSENECK SWING
SPOUT WITH SINGLE LEVER HANDLE, CHROME POLISHED IN COLOR.
SINGLE HOLE INSTALLATION WITH CERAMIC DISC VALVES AND 1.5 GPM
FLOW RATE.
TRIM: McGUIRE # LF2165CC LEAD FREE BRASS WHEEL HANDLE ANGLE
STOP VALVES WITH RISERS AND ESCUTCHEONS, McGUIRE # 151M CUP
STRAINER WITH 1-1/2" 17 GAUGE TAILPIECE, McGUIRE # B8912CF 1-1/2" 17
GAUGE CAST CHROME PLATED BRASS ADJUSTABLE P-TRAP WITH BRASS
CLEANOUT AND ESCUTCHEON.

PROVIDE WITH "TMV-1" AS SCHEDULED.

T-1 TRANSFORMER: SLOAN # EL-154 120 VAC / 24 VAC, 50 VA. REFER TO ELECTRICAL DRAWINGS FOR WIRING OF TRANSFORMER.

THERMOSTATIC MIXING VALVE: POWERS # LFe480, SOLID LEAD FREE BRASS BODY, THERMOSTATIC WAX ELEMENT, CORROSION RESISTANT INTERNAL PARTS, AND INTEGRAL CHECKS, ASSE 1070 COMPLIANT, CAPABLE OF 2.2 GPM WITH A 20 PSI DIFFERENTIAL AND A MINIMUM FLOW RATE OF 0.5 GPM. SET TEMPERATURE TO 110F FOR DUEL TEMPERATURE LAVATORIES AND HAND SINKS, 100F FOR SINGLE TEMPERATURE LAVATORIES AND HAND SINKS AND 120F FOR SINKS. MOUNT BELOW THE

PLUMBING FIXTURE WHERE INDICATED ON PLAN(S).

TP-1

TRAP PRIMER: PRECISION PLUMBING PRODUCTS # PR-500 "PRIME RITE",
CORROSION RESISTANT BRASS BODY, "O" RING SEALS, 1/2" INLET AND
OUTLET, AND INTEGRAL VACUUM BREAKER. INSTALL THE VALVE AT A

MINIMUM OF 12" ABOVE FINISHED FLOOR.

TS-1

TIME SWITCH: INTERMATIC #ET1705CSPST, 7 DAY, ONE CIRCUIT-SINGLE
POLE SINGLE THROW, ELECTRONIC TIME SWITCH OR EQUAL BY TORK.
TIME SWITCH SHALL BE MOTOR RATED (1 H.P. @ 120 VOLT, SINGLE PHASE),
MINIMUM OF 20 SET POINTS (14 ON/OFF CYCLES) AND BATTERY BACK UP.
COORDINATE WITH DIVISION 16 FOR INSTALLATION AND INTERLOCK OF
TIME SWITCH IN SERIES WITH THE AQUASTAT AND RECIRCULATION PUMP.

FLOOR-MOUNTED WATER CLOSET (ADA ACCESSIBLE): AMERICAN STANDARD # 3043.001 "MADERA" WHITE VITREOUS CHINA FIXTURE WITH ELONGATED UNIVERSAL BOWL AND DIRECT-FED SIPHON JET ACTION. MEETS DEFINITION FOR HIGH EFFICIENCY TOILET (HET).

VALVE: SLOAN "OPTIMA – SLOAN MODEL" # 111 ES-S TMO 1.6 GALLON PER FLUSH EXPOSED, CHROME-PLATED, HARD WIRED, SENSOR OPERATED, DIAPHRAGM TYPE, FLUSH VALVE LESS TRANSFORMER WITH CHLORAMINE RESISTANT DIAPHRAGM AND PROTECTED ORIFICE, MANUAL OVERRIDE, ESCUTCHEON, INTEGRAL SCREWDRIVER STOP, VACUUM BREAKER, AND SWEAT ADAPTER KIT. INSTALL FLUSH VALVE HANDLE ON THE WIDE SIDE OF THE STALL

TRIM: CHURCH # 9500SSCT WHITE OPEN-FRONT CONTOURED, SOLID

PLASTIC, HEAVY DUTY, SEAT LESS COVER WITH SELF-SUSTAINING CHECK HINGES AND STAINLESS STEEL BOLTS.

WHA

WATER HAMMER ARRESTER: PRECISION PLUMBING PRODUCTS, HARD DRAWN COPPER BODY WITH WROUGHT COPPER FITTINGS, PISTON TYPE WITH LUBRICATED EPDM "O" RING SEALS, MEETING ASSE 1010 OR PDI WH-201. PROVIDE PDI SIZES "A" THROUGH "F" AS SHOWN ON PLANS. PROVIDE SIZE "A" UNLESS SHOWN OTHERWISE ON THE PLANS.

-1 WALL-MOUNTED LAVATORY (ADA ACCESSIBLE): AMERICAN STANDARD # 0355.012 "LUCERNE" 20-1/2" X 18-1/4" RECTANGULAR WALL MOUNTED WHITE VITREOUS CHINA FIXTURE WITH FAUCET LEDGE AND FRONT OVERFLOW. FAUCET: PROVIDE WITH SLOAN # ETF-600-LT 4" CENTERSET, HARD WIRED, SENSOR OPERATED FAUCET LESS TRANSFORMER WITH "Y" STRAINER FILTERED SOLENOID VALVE AND 0.35 GPM AERATOR. TRIM: McGUIRE # 155A GRID DRAIN WITH TAILPIECE, McGUIRE # 2165CCLK LOOSE KEY COMPRESSION ANGLE STOP VALVES WITH RISERS AND ESCUTCHEONS, McGUIRE # B8872CF 1-1/4" 17 GAUGE CAST CHROME PLATED BRASS ADJUSTABLE P-TRAP AND WASTE ARM WITH CLEANOUT PLUG AND ESCUTCHEON, CONCEALED ARM CARRIER WITH STANCHIONS TO FLOOR, PLUMBEREX "PRO-EXTREME" # X-4222 INSULATION KIT FOR WATER AND WASTE PIPES.

PARAGON STAR

LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY

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REGISTRATION



08/06/3 BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

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ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR FOGEL ANDERSON

HENDERSON

SHEET TITLE

PLUMBING SCHEDULES

P6 00

A. GENERAL REQUIREMENTS

All requirements under Division 01 and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01 this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each system as implied by the design and equipment specified.

The specifications and drawings for the Project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

	2004 Edition	1995 Edition
1.	Division 21 – Fire Suppression	Division 15
2.	Division 22 – Plumbing	Division 15
3.	Division 23 – HVAC	Division 15
4.	Division 26 – Electrical	Division 16
5.	Division 27 – Communications	Division 16
6.	Division 28 – Electronic Safety and Security	Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Provide: "to furnish and install, complete and ready for the intended use."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work.

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include A Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or

unavailability of required warranty terms. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

The term lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content of less than or equal to 0.25% per safe drinking water act as amended January 4, 2011 Section 1417.

C. PREBID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Install material and equipment in accordance with the manufacturer's installation instructions. Model numbers listed in specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model

Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards.

Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes and laws.

The complete installation shall function as designed and intended with respect to efficiency, capacity, noise level, etc. Abnormal noise caused by rattling equipment, piping and squeaks in rotating components shall not be acceptable. Materials and equipment shall be of commercial specification grade in quality. Light duty and residential grade equipment shall not be accepted unless otherwise indicated.

Remove from the premises waste material present as a result of his work, including cartons, crating, paper, stickers, and/or excavation material not used in backfilling, etc. Clean equipment installed under this contract to present a neat and clean installation at the termination of the

Repair or replace public and private property damaged as a result of work performed under this contract to the satisfaction of authorities and regulations having jurisdiction. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety of the public.

MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years.

COORDINATION

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.

Unless otherwise indicated, General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings when required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute his work in such a manner as not to interfere with or delay the work of other trades. Figured dimensions shall be taken in preference to scaled dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors which could have been avoided by proper checking and verification.

Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim

ORDINANCES AND CODES

Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set

- forth by the following: National Fire Protection Association (NFPA) Underwriters Laboratories (UL)
- Occupational Safety and Health Administration (OSHA) American Society of Mechanical Engineers (ASME)
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) American National Standards Institute (ANSI)
- American Society of Testing Materials (ASTM) Other national standards and codes where applicable.

Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent.

Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution. Contractor will be held responsible for any violation of the law.

Procure and pay for permits and licenses required for the accomplishment of the work herein described. Where required, obtain, pay for, and furnish certificates of inspection to Owner.

PROTECTION OF EQUIPMENT AND MATERIAL

Store and protect from damage equipment and material after delivery to job site. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment and material damaged by construction activities shall be rejected and Contractor shall furnish new equipment and material of a like kind at his own expense.

Keep premises broom clean of foreign material created during work performed under this contract. Piping, equipment, etc. shall have a neat and clean appearance at the termination of

Plug or cap open ends of piping systems while stored and installed during construction when not in use to prevent the entrance of debris into the systems.

Keep the manufacturer-provided protective coverings on floor drains, floor sinks and trench drains during construction. Remove coverings at the termination of the work and polish exposed

SUBSTITUTIONS

Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request From for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following: Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request. Proposed substitution is consistent with the Contract Documents and will produce

indicated results, including functional clearances, maintenance service, and sourcing of replacement parts. Proposed substitution has received necessary approvals of authorities having

Same warranty will be furnished for proposed substitution as for specified Work. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby. 6. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids.

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents.

SUBMITTALS

Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Prior to transmitting submittal, verify that the equipment submitted is mutually compatible and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time or resubmittal, if required. Only resubmit those sections requested for resubmittal.

Submittals shall contain the project name, applicable specification section, submittal date. equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to

Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. For equipment with motor starters or VFDs, include short circuit current ratings. Mark out inapplicable items. Shop drawings will be returned without review if the above mentioned requirements are not met.

Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are schedule for UL listing, location, wall or floor rating and installation drawing for each penetration provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name, and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the

documents required to purchase the materials and/or equipment in the electronic submittal. The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, size of members, or quantities, omissions of components or fittings; coordination of electrical requirements; and not coordinating items with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

K. ELECTRONIC DRAWINGS

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive, or direct download, as desired, from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, written authorization from the Architect and release agreement form from the Engineer must be received before electronic drawing files will be sent.

RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

See Division 01 and General Conditions for additional information.

M. OPERATION AND MAINTENANCE INSTRUCTIONS

During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment manufacturer. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of contents.

Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect, for Engineer's review, at the termination of the work. Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment itself for inclusion in this

Include record drawings as described above.

Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

N. SPARE PARTS

Furnish to Owner, with receipt, the spare parts for faucet washers and O-rings, flushometer repair kits, and water closet tank repair kits for the fixtures furnished for this project.

At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of the equipment provided for this project.

Provide training to include, but not be limited to, an overview of the system and/or equipment as it relates to the facility as a whole; operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention; and review of data included in the operation and maintenance manuals. Submit a certification letter to the Architect stating that the Owner's designated representative has been trained as specified herein. Letter shall include date, time, attendees and subject of training. The Contractor and the Owner's representative shall sign the certification letter

Schedule training with Owner with at least 7 days advance notice.

indicating agreement that the training has been provided.

intended without leaks, excessive noise, or water hammer.

P. WARRANTIES

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01. Warranty shall include a guarantee of free circulation of liquids throughout the system as

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

Perform the remedial work promptly, upon written notice from the Engineer or Owner. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

GENERAL MATERIALS AND INSTALLATION

A. EXCAVATION AND BACKFILLING

Perform excavation and backfill required for installation of underground work under this contract. Trenches shall be of sufficient width. Crib or brace trenches to prevent cave-in or settlement. Do not excavate trenches close to columns and walls of new building without prior consultation with the Architect. Use pumping equipment if required to keep trenches free of water. Backfill trenches in maximum 6 inch layers of well-tamped dry earth in a manner to prevent future

Excavation as specified herein shall be classified as common excavation. Common excavation shall comprise the satisfactory removal and disposition of material of whatever substances and of every description encountered, including rock, if any, within the limits of the work as specified and shown on the drawings. Excavation shall be performed to the lines and grades indicated on the drawings. Dispose of excavated materials that are considered unsuitable for backfill and surplus of excavated material which is not required for backfill to the satisfaction of the Architect.

B. EXTERIOR UTILITY CONNECTIONS

Terminate domestic water, storm, and sewer lines at a point approximately five feet from the building wall, or as shown on the drawings. Make connection to the various services provided by others and coordinate connection requirements with civil engineer. Verify that installation will tie into the various services provided by others at the indicated invert elevation point prior to installation. If the installation will not tie into the indicated invert elevation point while maintaining proper fall, notify architect and civil engineer so that an alternative may be determined.

furnished by the serving utility.

C. COINCIDENTAL DAMAGE

Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of the work. Repair materials shall match existing construction. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the D. CUTTING AND PATCHING

Conform to the requirements in Division 01. Cut walls, floors, ceilings, and other portions of the

as small as possible. Patch walls, floors, and other portions of the facility as required by work

under this division. Patching shall match original material and construction including fire ratings,

Provide service piping and accessories required to complete utility connections that are not

facility as required to install work under this division. Obtain permission from the Architect prior to cutting. Do not disturb structural members without prior approval from the Architect. Cut holes

if applicable. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect. E. ROUGH-IN

Coordinate without delay all roughing-in with other divisions. Conceal piping, conduit, and rough-

in except in unfinished areas and where otherwise shown.

F. SUPPORT SYSTEMS Structural steel used for pipe supports, equipment supports, etc., shall be new and clean, and shall conform to ASTM designation A-36.

Support plumbing equipment and piping from the building structure. Do not support plumbing equipment and piping from ceilings, other mechanical or electrical components, and other nonstructural elements.

G. ACCESS DOORS

H. PENETRATIONS

Provide access doors for all concealed equipment where indicated or as required, except where above lay-in ceilings. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction for type of construction in which it is installed. Obtain Architect's approval of type, size, location, and Up to 140F hot water and hot water return piping: 1" thick for 1-1/4" and smaller and 1-1/2" thick for color before ordering. Provide factory-tabricated and assembled units, complete with attachment devices and fasteners ready for installation, concealed hinges, flush screwdriver-operated cam lock, and anchor straps. Provide access doors manufactured by Milcor, Titus, Zurn, or equal.

Provide sleeves for pipes passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide 10 gauge galvanized steel sleeves for sleeves 6 inches and smaller. Provide galvanized sheet metal sleeves for larger than 6 inches. Schedule 40 PVC sleeves are acceptable for installation in areas without return air plenums.

shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of 1/2 inch of sealant. Seal around penetrations of fire rated assemblies. Coordinate fire ratings and locations with the architectural drawings. Refer to architectural specifications for fire stoppings. Provide a product

Seal elevated floor, exterior wall and roof penetrations watertight and weathertight with non-

Extend pipe insulation for insulated pipe through floor, wall and roof penetrations, including fire rated walls and floors. The vapor barrier shall be maintained. Size sleeve for a minimum of 1 inch annular clear space between inside of sleeve and outside of insulation.

Seal elevated concrete slab with water proof membrane penetrations with "wall pipes" and water proof sealant. Secure waterproof membrane flashing between "wall pipe" clamping flange and clamping ring. Provide cast iron "wall pipes" with integral waterstop ring manufactured by Josam, Jay R. Smith, Wade, Watts or Zurn.

Provide sleeves for horizontal pipe passing through or under foundation. Sleeves shall be cast iron soil pipe two nominal pipe sizes larger than the pipe served. Provide Schedule 40 PVC pipe sleeves for vertical pressure pipe passing through concrete slab on grade. Sleeves shall be one nominal pipe size larger than the pipe served and two pipe sizes

larger than pipe served for ductile iron pipes with restraining rods. Seal water-tight with silicone Provide 1/2 inch thick cellular foam insulation around perimeter of non-pressure pipe passing thru concrete slab on grade. Insulation shall extend to 2 inches above and below the concrete

FIRESTOPPING

or 3M corp.

Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL acceptable to

Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United States Gypsum Company

Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire stop system. Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering

judgment or equivalent fire-resistance-rated assembly. Include qualifications data for testing

ELECTRICAL WIRING

Line voltage wiring shall be provided by Division 26. Line voltage control and interlock wiring for plumbing systems shall also be provided by Division 26. Low voltage control wiring shall be provided by Division 23. Furnish wiring diagrams to Division 26 as required for proper equipment hookup. Coordinate with Division 26 the actual wire sizing amps for plumbing equipment (from the equipment nameplate) to ensure proper installation.

K. EQUIPMENT FURNISHED BY OTHERS

Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation of equipment furnished by others in locations as indicated on the drawings, specified herein, or both. Furnish and install roughed-in wastes, vents and water services. Provide final connection to kitchen equipment, furnished by others, in locations as indicated on the drawings. Provide accessory items that are required but not furnished with the equipment including traps, stop valves, PRVs, indirect drain from equipment to floor drains, and accessory items indicated or required for the proper operation of the complete system at the

Contractor shall be responsible for correct rough-in dimensions and shall verify same with Architect and/or equipment supplier prior to service installations.

Upon completion of each phase of the installation, test each system in conformance with local code requirements and as noted below. Furnish labor and equipment required to test each system installed under this contract. Assume all costs involved in making the tests and repairing and/or replacing any damages resulting therefrom.

Notify the Architect and the AHJ, three (3) working days prior to making plumbing system tests. Leave concealed work uncovered until the required tests have been completed, but if necessary due to construction procedure, tests on portions of the work may be made, and when satisfactory, the work may be concealed. Test piping before insulation is installed, and before backfill. Pipes, joints, flanges, valve stems, etc., shall be leak tight. Repair or replace system defects with new materials. Caulking of defective joints, cracks or holes will not be permitted. Repeat tests after defects have been eliminated. Make tests in the presence of the

administrative authority and/or the Owner's authorized representative. Upon completion of the systems installation, and prior to acceptance by the Architect and Engineer, make general operating tests to demonstrate that equipment and systems are in proper working order, and are functioning in conformance with the intent of the drawings and specifications. As a part of these tests, open every water outlet to ensure complete system flushing, remove and clean faucet aerators, clean strainers, light pilot lights, and operate every piece of equipment furnished under this contract to demonstrate proper functioning.

Test the drainage and vent system by plugging openings with test plugs, except those at the top of the stacks. Fill the system with water; test results will be satisfactory if the water level remains stationary for not less than one (1) hour. Subject the drainage and vent system to a pressure of at least ten (10) feet of water. If leaks develop, repair them and repeat the test.

Test the domestic water system by filling it with water and then isolating the system from its source. Keep the system closed for a period of twenty-four hours with no fixture being used. The pressure differential for this test period shall not exceed 10 psig. Test water piping to a 125 PSI hydrostatic

PLUMBING PIPING

PIPING MATERIALS

Materials specified or noted on the drawings are subject to the approval of local code authorities. Verify approval before installing any material or joining method.

Domestic Water (Cold, Hot and Hot Water Recirculation): Domestic water piping installed above the floor slab inside the building shall be Type "L" hard temper copper tube with wrought copper fittings and soldered connections made up with 95/5 solder. Brazed mechanically formed tee connections (T drill) may be used in copper lines where approved by code; connection shall be brazed joints made with AWS A5.8, BAg Silver filler metal.

Underground domestic water piping 2 inch and smaller shall be Type "K" soft temper copper tubing with flared copper alloy fittings and connections, or Type "K" hard temper copper tubing with conventional wrought copper fittings and brazed joints made with AWS A5.8, BAg Silver filler meta. Install as few underground copper piping joints as possible. At building service entrance, no joints shall be installed under or within 5 feet of the building. Install domestic water piping below grade outside building at adequate depth to prevent freezing.

Underground domestic water piping 3 inch and larger shall be class 52 ductile iron meeting the requirements of ANSI / AWWA Standard C151/A21.51. Piping shall be double cement lined in accordance with ANSI / AWWA Standard C104/A21.4. Fittings shall have mechanical joints. At contractor's option, pipe joints in straight runs (not at fittings) and not installed under or within 5 feet of the building slab may be push-on joints. Joints shall conform to the requirements of ANSI A21.11. Interior Waste And Vent Below Slab: Waste and vent pipe below slab inside building shall be service weight cast iron soil pipe with hub and spigot fittings with neoprene gasket joints, meeting ASTM A74, manufactured by AB & I Foundry, Charlotte or Tyler pipe and bearing the trademark of the CISPI and

NSF. Hubless waste and vent pipe is not permitted below base slab. PVC schedule 40 DWV ASTM

D2665 pipe with PVC meeting ASTM D1784, "solid wall" cell class 12454-B with ASTM 2665 socket

Interior Waste and Vent Above Slab: Waste and vent pipe above slab inside building shall be hubless cast iron soil pipe and fittings, meeting ASTM A888 and CISPI 301, manufactured by AB & I foundry, Charlotte or Tyler pipe and bearing the trademark of the CISPI and NSF. PVC schedule 40 DWV ASTM D2665 pipe with PVC meeting ASTM D1784, "solid wall" cell class 12454-B with ASTM 2665 socket fittings with solvent weld joints is also permitted where approved by code. (Note: PVC piping is

Interior Storm: Inside building shall be same as specified for interior waste and vent pipe.

fittings with solvent weld joints is also permitted where approved by code.

B. PIPING AND EQUIPMENT INSULATION

not allowed in ceiling return air plenums)

Owens-Corning.

Connections to Plumbing Fixtures and Equipment: 1-1/4 inch and larger waste connections from fixture traps to cast iron pipe shall be "DWV" copper with wrought copper drainage pattern fittings with copper sweat or compression joints at fixture trap connections and threaded joints at connections to

Indirect and Condensate Drain Inside Building: Indirect and condensate drain pipe installed inside the building shall be Type "M" hard copper with wrought copper fittings for 1" and smaller and "DWV" copper with wrought copper drainage pattern fittings for 1-1/4" and larger hard temper copper tube and soldered connections made with 95/5 solder. Install cleanouts at elbows greater than 45 degrees. Slope piping at 1/8" per foot.

Indirect And Condensate Drain Outside Building: indirect and condensate drain pipe installed outside the building above ground shall be ASTM A53 Schedule 40 galvanized steel pipe with galvanized malleable iron fittings. Terminate at nearest roof drain, gutter or other location as shown drawings. Install cleanouts at elbows greater than 45 degrees. Slope piping at 1/8" per foot.

Provide domestic cold water, hot water, hot water recirculation, indirect and condensate drain pipe (within building) interior horizontal storm drain piping above ceiling and exposed with one-piece

fiberglass insulation with all-service jacket with self-sealing lap to provide a continuous vapor barrier by CertainTeed Corp., Knauf Insulation, Johns Manville or Owens Corning. Provide Insulation

Provide 1 inch fiberglass insulation on vent piping within six feet of vent through the roof.

Provide fiberglass insulation on domestic cold and hot water pipes installed in walls and chases. Roof Drain Bodies: 2 inch one-piece fiberglass covering with fire-resistant jacket with self-sealing lap to provide a continuous vapor barrier, by CertainTeed Corp., Knauf Insulation, Johns Manville or

For hot and cold water piping installed inside masonry units of walls, provide 1/2 inch flexible unicellular insulation by Auroflex USA, Inc., Armacell LLC. or K-Flex USA.

Insulate water heaters, storage tanks, hot water pumps, etc. that are not factory insulated. For hot piping, provide pipe hangers and riser clamps sized for the outside diameter of piping. Butt insulation to hanger or riser clamp for vertical pipe. Seal exposed insulation with insulation sealer. Exception for Vertical Piping: Provide clamps sized for the outside diameter of the vertical pipe and extend clamp through insulation. Seal penetrations of insulation and vapor barrier with wet coat of vapor barrier lap cement. For 2-1/2" and larger cold piping at hangers, provide 8 inch long sections of cellular glass meeting ASTM C552 by Johns-Manville, Fiberglass by Knauf or flexible unicellular piping insulation meeting ASTM C 534-01A, Type I with integral high density pipe supports and encased in steel insulation shield by Cooper B-line, Armacell, or approved equal. Insulation shall be continuous along the pipe surface, except at valves, unions, and where piping is exposed at fixtures. For pipes 2 inch and smaller using fiberglass or flexible elastomeric insulation without pre-insulated supports, provide insulation protection shields installed between hanger and pine which meets the following

Pipe	Insulation		Minimum Shield Length, (in)					
Size	Thickness		H	langer S	pacing, (ft)		
(NPS)	(inches) 5	6	7	8	9 (10		
` '	ì	3	5	5	-	-	-	
Less than 1"	1.5	3	5	5	-	-	-	
	1	5	6	8	9	11	11	
1-1/4" to	1.5	5	6	8	8	9	9	
2" and Less	2	5	5	6	6	8	8	

Cover fittings with Johns Manville Zeston 2000 PVC or approved equal one-piece PVC premolded insulating covers. Fitting covers, jackets and adhesives shall not exceed flame spread rating of 25 and smoke development rating of 50 per ASTM E84. Fill voids between covers and piping with fiberglass insulation and tape joints at all elbows and tees. Install pipe insulation in compliance with manufacturer's recommendations. Where premolded insulating fittings are not approved by the local

AHJ, miter insulation at fittings.

installed in compliance with the fitting manufacturer's recommendations.

C. PIPING JOINTS Copper Tubing: Joints in hard temper tubing shall be soldered joints using lead-free 95/5 solder except where tubing is installed below grade or below the base slab, in which case joints shall be soldered with silver solder (Sil-Fos). Joints in soft temper copper tubing shall be of the flared type

Cast Iron Pipe Below Grade: Joints in bell and spigot cast iron waste and vent pipe shall be neoprene compression gaskets, Tyseal or equal. Cast Iron Pipe Above Grade: Joints in hubless pipe shall be standard CISPI 310 NSF certified by

Anaco, Ideal, Misson or Tyler. Joints in storm piping, including connections to roof drains, shall be

heavy duty couplings meeting ASTM C1540 and FM 1680, Anaco Husky #HD-2000, Clamp-All "Hi Torque" 80 in. lb, Ideal Tridon "HD" or Mission "Heavyweight". PVC Pipe: Clean joints free from debris and moisture. Apply PVC primer meeting ASTM F656 to each joint. Apply solvent cement meeting ASTM D2564 and make joint while wet and in accordance with

Dissimilar Pipes Above Grade: Make connection of new waste pipe to new or existing dissimilar waste pipe using shielded transition couplings meeting ASTM C1460 with neoprene adapter gasket

with stainless steel shield and hose clamps. Fernco, Proflex 3000 Series or Mission Flexseal MR56

Dissimilar Pipes Below Grade: Make connection of new waste pipe to new or existing dissimilar waste pipe using shielded adapter couplings meeting ASTM C1173 with neoprene adapter gasket with stainless steel shield and hose clamps, Fernco, 1056 Series or Mission Sewer Couplings.

PIPING INSTALLATION

General: Clean pipe thoroughly prior to installation. Ream ends of pipe to remove burrs. Cut pipe accurately to measurements taken on the job. Install with adequate clearance for installation of coverings where required. Pipe shall not be sprung or bent. Neatly align pipe, connect it securely, and support it from the building structure with hangers as specified below. Provide chrome-plated escutcheons on pipes passing through ceilings, floors or walls of finished spaces. Run pipes freely through floor and wall penetrations using pipe sleeves. Do not grout in place unless required for structural fire integrity. Install pipe concealed in finished spaces wherever possible. Use a dielectric union where ferrous and copper pipe connect. Dielectric union shall have a zinc-plated steel body, a threaded nylon insert, and insulating pressure gasket. No ferrous metal-to-copper connection made without insulating unions will be allowed.

Hanger & Supports: Pipe hangers shall be as described in the specifications by B-Line or equal by Anvil, Elite Components, FNW, Michigan, Truscon, or Unistrut. Connect hangers to the structure with side beam connectors and all thread hanger rods. Provide engineered support struts between joists and other structural members as required to provide a rigid hanging installation. Do not hang pipes from other pipes, conduit or ductwork. Provide hanger rods and space hangers at intervals as specified in "hanger spacing". Provide support within 1 foot of each elbow and tee. Provide supports within 1 foot of each equipment connection. Provide two nuts on threaded supports to securely fasten the support. Install hanger types or supports for various piping as follows:

Copper Tube: Adjustable band hangers for bare copper tube 3 inches and smaller shall be B-Line #B3170 CT copper plated adjustable band swivel ring type. Adjustable band hangers for insulated copper tube 3 inches and smaller shall be B-Line #B3170 NF adjustable band swivel ring type. Clevis hangers for insulated copper tube 4 inches and larger shall be B-Line #B3100 galvanized steel clevis type. Support exposed copper tube 2 inches and smaller to walls or in chases with B-Line #B3198RCT copper coated extension split ring pipe clamps, 3/8 inch threaded rod and B-Line #B3199CT ceiling flanges. Support copper tube in chases and walls at plumbing fixtures with plastic or copper brackets secured to structure and U-bolts sized to bare on the pipe. Riser clamps to support vertical copper tube shall be B-Line #B3373CT copper coated steel, cut insulation, seal vapor barrier, and attach to

Cast Iron Pipe: Adjustable band hangers for 2 inch and smaller. Clevis hangers for 3 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support vertical pipe shall be B-Line #B3373 galvanized steel.

PVC Pipe: Adjustable band hangers for 3 inch and smaller. Clevis hangers for 4 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support vertical pipe shall be B-Line #B3373 galvanized steel.

Insulation Protection Shields: B-Line #B3151 of 18 gauge galvanized sheet metal. Shield shall cover half of the circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

Hanger Spacing, Rod Sizes & Connectors: Connect rods to steel beams or joists with B-Line #B3031 or #B3033 beam clamps as required. Connect rods to concrete with B-Line #3014 malleable iron single type inserts with malleable iron nut. Connect rods in wood construction with B-Line #B3058 side beam connectors. Hang and support piping with spacing and rod sizes as

Copper Tube: 1-1/2 inch and smaller - every 6 feet with 3/8 inch hanger rods; 2 inch - every 10 feet with 3/8inch hanger rods: 2-1/2 inch - every 10 feet with 3/8 inch hanger rods: 3 inch - every 10 feet with 1/2 inch rods, 4 inch - every 10 feet with 5/8 inch hanger rods. Support vertical

copper tube every 10 feet. Cast Iron Pipe: Every 10 feet and within 1 foot of each joint. 2 inch and smaller with 3/8 inch hanger rods; 3 inch with 1/2 inch hanger rods; 4 inch with 5/8 inch hanger rods; 6 inch with 3/4 inch hanger rods; 8 inch and larger with 7/8 inch hanger rods. Support vertical cast iron pipe

PVC Pipe: Support all pipes sizes every 4 feet. 1-1/2 inch and smaller with 3/8 inch hanger rods; 2 inch with 1/2 inch hanger rods; 2-1/2 inch and 3 inch with 1/2 inch hanger rods, 4 inch and larger with 5/8 inch hanger rods. Support vertical PVC pipe every 4 feet.

every 15 feet.

Supports on Roof: Support piping on roof with pre-engineered roof pipe supports manufactured by B-line, Erico, FNW, Miro or Portable Pipe Hangers: 4 inch x 4 inch x 12 inch long closed cell polyethylene blocks with embedded pre-engineered support strut or pre-engineered support struts with factory plastic bases. Two piece straps shall be captivated at the shoulder when attachment nut is tightened and designed for use with strut system. All nuts, brackets and clamps shall have the same finish as the channels. Support pipe with spacing as described above at a minimum 7 inches above the roof. Set supports on 18 inch x 18 inch x 3/16 inch thick roof walkway material compatible with actual roof material.

Supports On Floor: Support piping from the floor where required for ferrous pipe or insulated copper tube, shall be B-Line B3093 galvanized steel with pipe saddle, threaded shank for height adjustment and floor stand secured to the floor.

Below Ground Installation for Soil, Waste, and Storm: Install soil and waste piping to a uniform slope of not less than 1/8 inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Slope storm piping at 1/8 inch per foot. Lay pipe at uniform slope, free from sags, with hub end upstream. Make changes in direction from horizontal to vertical, at fixture branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y and 1/8 bend" fittings, or 45 degree "ells" (1/8 bend fittings), 1/6 bend or 1/16 bend and "Y" fittings. Install pipe with the barrel of the pipe on firm, solid earth for its entire length, and excavate holes for the pipe bells. Lay pipe in a straight line and install with uniform grade to line with batten boards set not more than 24'-0" apart. Close open ends of pipe with a stopper when pipe laying is not in progress. Center spigots accurately in bells for uniform caulking. Provide a smooth and uniform invert in the system. Drilling or tapping of soil and waste lines, and saddle hubs and bands are not permitted. Locate and install soil and waste lines as indicated on the drawings. Determine exact locations in such a manner as to maintain proper clearance. Prior to installation of any building drain pipe, verify elevation of connection point of existing sewer, service line or existing tenant connections indicated on the drawings. If the installation will not tie into the indicated invert elevation point while maintaining proper fall, notify Architect so that an alternative may be determined.

Above Ground Installation for Soil, Waste, and Storm: Install soil and waste piping to a uniform slope of not less than 1/8 inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Slope storm piping at 1/8 inch per foot. Lay pipe at uniform slope free from sags. Support pipe within 12 inches of each joint. Make changes in direction from horizontal to vertical, at fixture branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y and 1/8 bend" fittings, or 45 degree "ells" (1/8 bend fittings), 1/6 bend or 1/16 bend and "Y" fittings. Provide a smooth and uniform invert in the system. Drilling or tapping of soil and waste lines, and saddle hubs and bands are not permitted. Locate and install soil and waste lines as indicated on the drawings. Determine exact locations in such a manner as to maintain proper clearance.

extend vent pipes full size through the root line. Grade pipe to a uniform slope so as to drain back by gravity to the drainage piping system. Vents passing through the roof shall be minimum 3 inch size except in tropical climates. Turn flashing down into stacks at least 2 inches, and extend flashing 24 inches in all directions from the pipe at the roof line. Vent lines shall be air and water tight. Domestic Water: Arrange cold, hot, and hot water recirculation piping to drain at the lowest point in each system. Install at least one pipe union adjacent to all shutoff valves, at connection points

of each piece of equipment, and elsewhere in the system where required to allow proper

maintenance. Provide unions of the ground joint type. Make allowance for expansion and

contraction where required by the installation. Where water piping occurs in exterior walls, hold

pipe as close as possible to the interior face of wall and install insulation batt or other insulation

Plumbing Vent: Connect plumbing vent pipes to fixture drain pipes as indicated on the drawings

or as required by the installation practices adopted and enforced by local codes official, and

(minimum R-8) between piping and the exterior wall face. E. PIPING SANITIZATION

containing not less than 50 ppm available chlorine. Keep solution in the system for a minimum of 24 hours, with each valve being operated several times during the period. After completion, flush system with city water until chlorine residual is lowered to incoming city water level. F. PIPE AND VALVE MARKERS

Provide manufacturer's standard pre-printed, semi-rigid snap-on or permanent adhesive,

Sanitize the entire domestic water piping system (cold, hot, and hot water return) with a solution

Install pipe markers on each plumbing piping system and include arrows to show normal Locate pipe markers and color bands wherever piping is exposed to view in occupied spaces,

pressure-sensitive vinyl pipe markers. Pipe markers shall be color-coded complying with ANSA

machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior nonconcealed locations. Provide plastic laminate or brass valve tag on every valve, cock and control device in each plumbing piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibbs, and shut-off valves at

4. PLUMBING SPECIALTIES

hammer arrestors comply with NSF 61 Annex G and/or NSF 372.

plumbing fixtures and similar rough-in connections of end-use fixtures and units.

WATER HAMMER ARRESTORS, AND TRAPS Provide water hammer arrestors at valves or batteries of fixtures as indicated on the drawings to prevent water hammer. Arrestors shall be Josam, Sioux Chief, Smith, Precision Plumbing Products, Proflo, Wade, Watts, or Zurn, stainless steel bellows type, or O-ring sealed and lubricated acetal piston. Install water hammer arrestors per the Plumbing and Drainage Institute (PDI) WH-201 installation instructions. Installation of arrestors at batteries of fixtures precludes the requirement for individual air chambers at each battery fixture. Submit certification that water

Provide water-seal traps on floor drains, fixtures and equipment with drain connections, including traps not furnished in combination with fixtures and equipment. Place trap as close to the fixture or drain as possible. Exposed traps in finished spaces shall be chrome-plated brass. Provide conventional "P" type trap, water-sealed self-cleaning design. Full "S" traps or trap standards shall be used only where specifically called for on the drawings or elsewhere in this

specification. Trap water seals shall not be less than 2 inches, and deep seal traps shall be

provided where specified or indicated. Each trap not integral with the fixture or floor drain or

installed below the base slab shall be provided with an accessible cleanout of adequate size. Provide trap primers where required by code and where indicated on the drawings.

B. CLEANOUTS, FLOOR DRAINS AND ROOF DRAINS Cleanouts, floor drains and roof drains shall be by one manufacturer if possible. Acceptable manufacturers are Josam, MIFAB, Sioux Chief, Smith, Wade, Watts, and Zurn. Provide long sweep fittings for cleanout extensions; short sweeps at start of runs or change in direction and combination wye and eight bend fittings in horizontal runs. Install cleanouts with a minimum of 18 inches clear all around, consult local codes for other requirements, for easy system

maintenance. Install plug with Teflon joint compound.

Floor Drains: As scheduled on the drawings. Floor Cleanouts: As scheduled on the drawings, Install cleanouts at points as noted on the drawings, at the building exit; at a minimum of every 50 feet in horizontal soil and waste lines; and at turns of pipe greater than 45 degrees cleanouts shall be full size of the pipe up to 4 inches, and 4 inch size for pipes larger than 4 inches. Determine the type of floor covering to be used at each floor cleanout location and provide top with variations suitable for floor covering (carpet markers, recessed for tile and scoriated for unfinished floor). Rough-in and install each floor cleanout flush with the finished floor construction.

Roof Drains: As scheduled on the drawings. Provide with roof sump receiver, extension. secondary flashing clamps and underdeck clamp as required; provide expansion joints where required. Provide overflow roof drains where indicated on the drawings with inlet flow line 2 inches above the primary roof drain inlet

VALVES, STRAINERS, HOSE BIBBS, AND UNIONS

Plumbing system valves shall be designed for 125 psi steam working pressure and 200 psi cold water pressure. Install valves on the hot and cold water lines at the water heater connections and other items of equipment, at branches from mains serving groups of fixtures, and at other places indicated or required by the installation to allow ease of future maintenance. Submit certification that valves, fittings and specialties comply with NSF 61 Annex G and / or NSF 372. Except for the following: Hose bibbs, hydrants, backflow preventers isolating irrigation or mechanical make-up systems, emergency mixing valves and trap primers.

piece lead free cast bronze body, with sweat ends, chrome plated bronze ball with conventional port, 600 psi, blow-out proof stem by Apollo # 70-LF-200, Hammond # UP8501, Milwaukee # Gate Valves 2-1/2 inch and Larger: Class 125, non-rising stem, iron body flanged wedge gate

Ball Valves 2 inch and Smaller (may be used in lieu of gate valves up to 2 inch): Class 150, two

with brass seats and stem by Apollo # 611, Hammond IR # 1138, Milwaukee # F-2882 or Nibco

Swing Check Valves 2 inch and Smaller: Class 125, lead free cast bronze body and with sweat ends by Apollo # 163S-LF, Milwaukee #UP-1509, or Nibco # S-413-Y-LF. Install in horizontal

Lift Check Valves 2 inch and Smaller: Class 125, lead free cast bronze body, stainless steel spring and with sweat ends by Hammond # LP-947 or Nibco # S-413-Y-LF. Install in vertical pipe or in horizontal runs where required.

Point of Use Thermostatic Mixing Valves: Thermostatic mixing valves shall be Powers as scheduled on the drawings by Powers or equal by Acorn Engineering Co., Cash ACME or Leonard meeting ASSE 1070 with lead free brass body, non-corrosive internal parts, tamper resistant temperature adjustment, union inlets and check stops with strainers. Install valve at public lavatories and handwashing sink locations in accessible location. Set temperature as scheduled on the drawings.

Strainers: Strainers 2 inch and smaller shall be Watts #LFS777SI with lead free cast bronze body and soldered ends, brass cap and Monel 40 mesh screen. Strainers 2-1/2 inch and larger shall be Watts #77F-DI-FDA-125 with flanged iron body with fused FDA epoxy coating, bolted iron cap and stainless steel screen with 1/16 inch perforations. Strainers size 2-1/2 inch and larger shall have a 1 inch blow-off line with a 1 inch gate valve connected to the blow-off connection and shall be extended to the nearest floor drain.

Drain Valves and Interior Hose Bibbs: As specified on the drawings by Prier or equal by

Exposed Interior Hose Bibbs: As specified on the drawings by Chicago or equal by Speakman, T&S Brass or Zurn. Wall Hydrants: As specifed on the drawings by Prier or equal Woodford, Josam, Prier, Wade,

Unions: Ferrous unions shall be Crane or equal, combination iron and brass, ground joint with screwed ends. Copper unions shall be streamline or equal, cast bronze sweat type with ground joint. Ferrous to copper unions shall be universal controls or equal, dielectric type with threaded

Automatic Flow Control Valves: For installation in hot water recirculation lines, shall be Flow

Watts or Zurn. Provide accessible shutoff valve and water hammer arrestor inside building.

Sanitary Roof Hydrants: As scheduled on the drawings by Hoeptner or equal by Mapa, Smith or

Design, Inc #ICSS or equal by Victaulic with stainless steel body and flow cartridge and sweat connections. Provide ball valve, strainer and check valve upstream and union and ball valve downstream of each automatic flow control valve. Provide flow control valve cartridges of the flows as indicated on the drawings.

Pressure Reducing Valves: Self contained type shall be of the type as scheduled and indicated on the drawings by Watts or equal by Cash-ACME or Wilkins. Backflow Preventers: Shall be of the type as scheduled and indicated on the drawings by Watts,

WATER SERVICE ENTRANCE: PRESSURE REDUCING VALVE AND BACKFLOW PREVENTER

Provide a backflow preventer (BFP) of type required by local code, and a pressure reducing valve (PRV) if required by water pressure greater than 80 psi, on the domestic water service immediately downstream of the backflow preventer at the water service entry. Set the pressure reducing valve as indicated on the drawings. Provide a pressure gauge and hose bibb with isolation valve down stream of the backflow preventer and / or PRV for system drain down. For water services 2 inch and smaller, provide a Type "K" soft copper tube that runs continuously from five feet outside the building with sweeping bend to 12 inches above the floor slab. Provide a shutoff valve at 12 inches above the floor. There shall be no fittings under the floor slab. Provide a PVC sleeve two pipe sizes larger than the water pipe served and seal with

For water services 3 inch and larger, provide ductile iron pipe and fittings from five feet outside the building to 12 inches above the floor. Provide a shutoff valve at 12 inches above the floor. Provide a PVC sleeve two pipe sizes larger than the water pipe served and seal with caulk.

Thermometers shall be American 3 inch bi-metal dial type with separable socket, and shall be installed where indicated or required.

Pressure gauges shall be Ashcroft 3 inch dial type with shut-off cock, and shall be installed

equal by Mifab or Sioux Chief with brass body and integral vacuum breaker. Provide distribution box where more than one trap is indicated to be primed on the drawings. Provide access panel Ice maker connection boxes shall be as specified on the drawings, Guy Gray #BIM875 or approved equal, with 20 gauge steel body, wall flange and lead free brass water connection.

Trap seals shall be by Proset systems or equal by Green Drain, Mifab, ProSet, Smith, Sure Seal

Systems or Zurn of molded PVC elastomer that allows the flow of waste water and closes upon

termination of flow. Install per manufacturer's installation instructions. Do not touch elastomeric

plug or allow contact with primer or solvent cement. Or, shall be by Sure Seal, Inc. of smooth,

Trap primers shall be as specified on the drawings, Precision Plumbing Products "Prime Rite" or

soft, flexible, elastomeric PVC material with a flapper closure. The flow of wastewater allows flapper to open and adequately discharge to floor drain through its interior. The flapper closes and returns to original molded shape after wastewater discharge is complete.

E. SYSTEM ACCESSORIES

where indicated or required.

5. PLUMBING FIXTURES AND EQUIPMENT

manufacturer where possible.

A. PLUMBING FIXTURES Furnish and install commercial grade plumbing fixtures, see the drawings for quantities and descriptions. Provide china fixtures as scheduled by American-Standard or approved equal by Gerber, Kohler, PROFLO, Sloan Valve Co, Toto-Kiki or Zurn. Provide stainless steel sinks as scheduled by Elkay or equal by Franke or Just. Provide mop sinks as scheduled by Stern-Williams or equal by Acorn Engineering Co., Fiat or Florestone. Provide fixtures of same

Fixtures shown on the drawings or specified herein shall be furnished and installed, set firm and true, connected to required piping services, thoroughly cleaned, left clean and ready for use. Exposed fittings and piping at the fixtures shall be chrome-plated, and water supply piping shall be valved at each fixture.

Vitreous china fixtures shall be of the best grade vitreous ware, without pit holes or blemishes, and the outlines shall be generally true. The engineer reserves the right to reject any pieces which, in his opinion, are faulty. Fixtures set against walls shall have ground backs and shall be caulked with silicone sealant of a matching color.

B. PLUMBING FIXTURE TRIM Submit certification that faucets and trim comply with NSF 61 Annex G and / or NSF 372. Except for the following: Faucets not used for drinking water or cooking, shower valves and heads or

Fixture trim shall have the manufacturer's name stamped clearly and visibly on each item. Provide faucets as scheduled on drawings by Chicago, Delta-Commercial, Speakmen, T&S

Provide electronic faucets as scheduled on the drawings by Sloan or equal by Zurn.

Fixture P-traps shall be 17 gauge brass body with cleanout, 17 gauge seamless tubular wall bend with cast brass slip nut, shallow steel flange, all chrome plated by McGuire, Brass Craft, Dearborn Brass, EBC, Proflo, Watts Brass and Tubular or Zurn. Lavatory, sink, and water closet supplies shall be solid brass angle or straight type with full turn

brass stem, wheel handle, or loose key types as noted on drawings, shallow steel flange, 3/8

Lavatory drains shall be grid type chrome plated 17 gauge brass open grid with 1-1/4 inch x 6

inch copper riser flange, all chrome plated, final connection as required by McGuire, Brass Craft,

inch long seamless brass tailpiece and brass locknut with heavy rubber basin washer and fiber friction washer, by McGuire, Brass Craft, Dearborn Brass, EBC, Franke, Proflo, Watts Brass and Tubular or Zurn. Sink drains shall be basket type with chrome plated forged brass basket strainer and strainer

nuts by McGuire, Brass Craft, Dearborn Brass, EBC, Proflo or Zurn.

fittings, including offset drain and continuous waste covers where required by Brocar, McGuire, Plumberex "Pro-2000", Proflo, Trap-Wrap or Tru-Bro. Provide diaphragm type flush valves as specified on drawings: Sloan or equal by Delaney or

Provide Smith, Josam, Wade, Watts, or Zurn chair carriers for mounting wall mounted lavatories

as described on the drawings. Securely fasten carriers to floor and test per manufacturer's

Provide handicap insulation kits for lavatories and sinks on exposed water and waste pipes and

body with 1-1/2 inch x 4 inch long seamless brass tailpiece and cast brass lock and coupling

recommendations prior to installation of partitions. Secure lavatory chair carriers to floor with 1/2 inch anchor bolts.

END OF SECTION 22

C. WATER HEATER

EBC, Proflo or Zurn.

Water heater shall be by A.O. Smith, Bock, Bradford-White, Hubbel, Lochinvar, State, HTP, Rheem or Ruud with capacity as scheduled on the drawings. Unit shall be electric glass-lined tank type complete with steel jacket, fiberglass insulation, magnesium anode, integral thermostats and controls, and temperature & pressure relief valve. Water heater shall be UL listed and meet ASHRAE 90.1B standards for thermal efficiency and standby heat loss. Temperature and Pressure Relief Valve: lead free brass body meeting ANSI Z21.22, The temperature shall be normally set to relieve at 210 F and the pressure relief shall be equal to the tank pressure rating . Install line size relief valve discharge line to discharge to an approved receptor with air gap.

Vacuum Relief Valve: Lead free brass body meeting ANSI Z21.22 with silicon disc. Valve shall open at 0.5 inches HG vacuum and be rated for 200 psig working pressure and 250 F operating temperature by Apollo #37, Cash ACME #VR801, Watts #N36 or Wilkins #VR-10. Install in cold water supply to each water heater downstream of the shutoff and check valves. Recirculation Pump: By B&G as scheduled on the drawings, or equal by Armstrong, Grundfos

Expansion Tank: Expansion tank shall be Amtrol "Therm-X-Trol" as scheduled on the drawings or equal by Armstrong, Bell & Gossett, Proflo, Taco, or Watts. Unit shall be constructed of welded carbon steel listed for 150 psig working pressure, with a FDA approved butyl rubber diaphragm, taps for pressure gage, air charging fitting, and drain fitting. Support as detailed on the drawings. Charge tank with air pressure equal to the static water pressure.

or Taco, of all bronze construction with Aguastat and/or timer.

greater than water heater diameter, with 3/4" screwed drain outlet by Holdrite, Killarney Metals, Oatey. Install under water heater on wall or ceiling supports or resting on elevated floor slabs. Install drain pan drain line to discharge to an approved receptor with air gap.

Water Heater Drain Pan: Galvanized steel or aluminum with outside diameter minimum 2"

PARAGON STAR

LOT 20 - HUB

3151 NW PARAGON PKWY Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET **REVISIONS**

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REGISTRATION



PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

BRADLEY E. CHAMBON

LICENSE # 028603

CIVIL LANDSCAPE HOERR SCHAUDT /

FOUNDATIONS BSE STRUCTURAL **ENGINEERS** BSE STRUCTURAL STRUCTURAL **ENGINEERS**

HENDERSON

ENGINEERS

ENGINEERS

PLUMBING

MECHANICAL HENDERSON **ENGINEERS** ELECTRICAL HENDERSON

FIRE PROTECTION HENDERSON

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 **TEL** 913.742.5000 **FAX** 913.742.5001 WWW.HENDERSONENGINEERS.COM

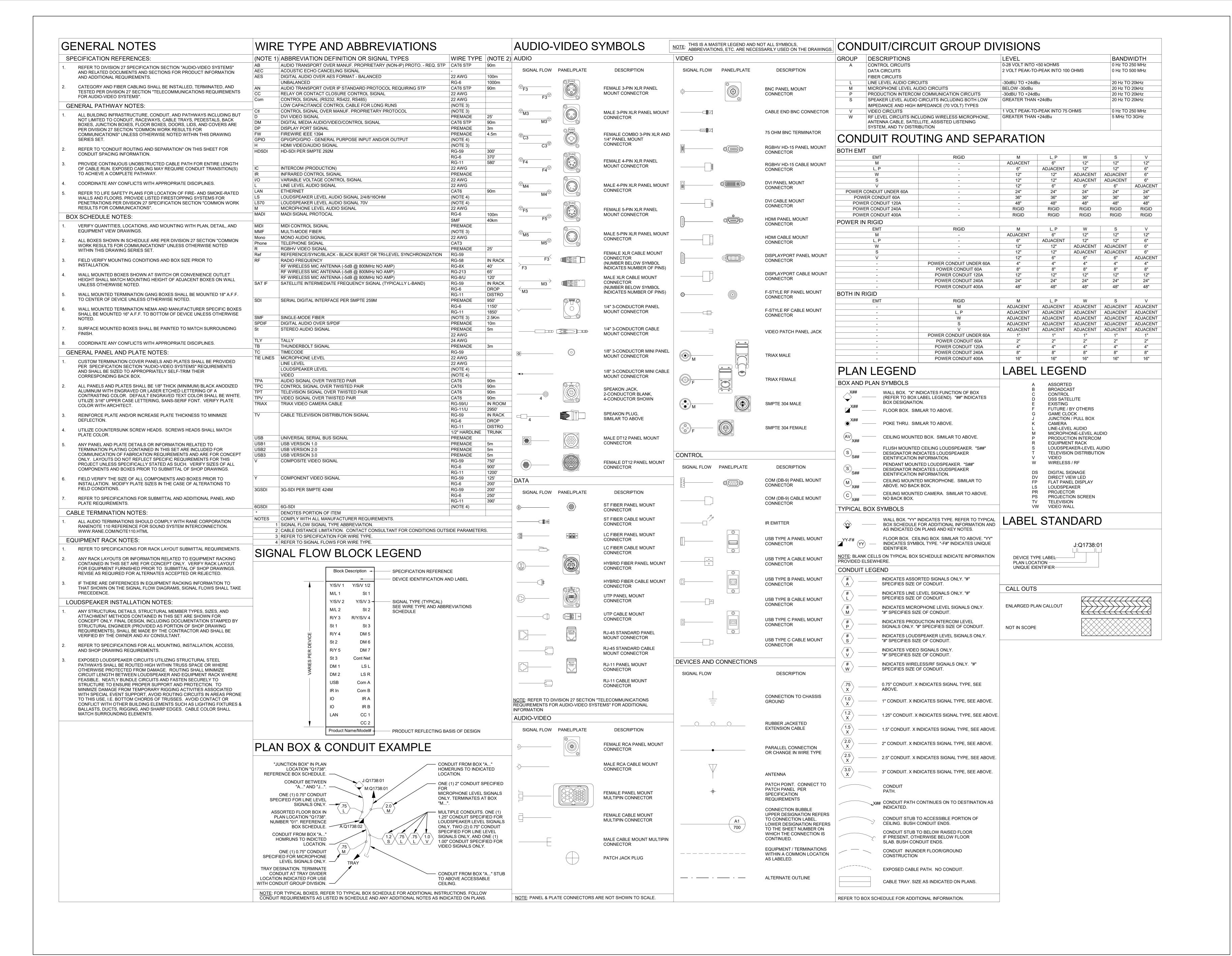
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EXPIRES 12/31/2021

CONTRACTOR FOGEL ANDERSON

SHEET TITLE

PLUMBING





3151 NW PARAGON PKWY Project No.: 19050.02

08/06/2021

Issued For: PERMIT SET

REVISIONS

REGISTRATION

PROJECT TEAM ARCHITECT

FINKLE+WILLIAMS

HOERR SCHAUDT /

HENDERSON

ARCHITECTURE

CIVIL

LANDSCAPE

PLUMBING

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

STRUCTURAL BSE STRUCTURAL **ENGINEERS**

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EXPIRES 12/31/2021

SHEET TITLE **AUDIO-VIDEO GENERAL NOTES AND** LEGEND



3151 NW PARAGON PKWY

Project	No.:	19050.02
Date:	(08/06/2021
Issued	For:	PERMIT SET
		REVISIONS
No.	Date	Description
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REGISTRATION

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / LAND3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTURAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

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EXPIRES 12/31/2021

SHEET TITLE

AUDIO-VIDEO FIRST FLOOR PLAN

	AUDIO-VIDEO BOX SCHEDULE - TYPICALS											
ВС	OX FUNCTION		OPERTIES	MOUNTING CONDITION	MOUNTING HEIGHT	BOX COVER & INSERTS	FURNISHED BY	INSTALLED BY	PROVIDED BY	CONDUIT SIZE & QTY	CONDUIT DESTINATION	CONDUIT ROUTING
ID	DESCRIPTION	B.O.D. MANUF.	B.O.D. MODEL	moontine condition		Box cover a moent	1 61 (1161) 2 1		11101152551		SONDON BEGING ANGLE	
T1	ASSORTED CONNECTION WALL BOX	CHIEF	PAC 526	FLUSH - IN WALL	CENTER OF DISPLAY	PROVIDE	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	(1) 1.25" E.C.	SERVER ROOM 108	STUB UP TO TRAY

				AUDIO-VIDEO FLAT PANEL	DISPLAY SCHEDULE				
	DISPLAY PROPERTIES				MOUNTING REQUIREMENT	S	DISPLAY RES		
ID	SPEC NAME	B.O.D. MANUF.	B.O.D. MODEL	INSTALL HEIGHT AFF. (CENTER OF DISPLAY)	TYPE	FURNISHED BY	INSTALLED BY	PROVIDED BY	NOTES
TV:100:01	LCD COMMERCIAL DISPLAY	SAMSUNG	QB55R	60"	WALL - FIXED	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	FOR VIEWING OF SECURITY FEEDS. DIV. 27 AV CONTRACTOF NOT RESPONSIBLE FOR PROVIDING CONTENT. SIGNAL EXTENSION USING HDBASET TRANSMIT/RECEIVE PAIR REQUIRED FOR SIGNAL EXTENSION TO SECURITY SERVER.
TV:100:02	LCD COMMERCIAL DISPLAY	SAMSUNG	QB55R	60"	WALL - FIXED	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	FOR VIEWING OF SECURITY FEEDS. DIV. 27 AV CONTRACTOF NOT RESPONSIBLE FOR PROVIDING CONTENT. SIGNAL EXTENSION USING HDBASET TRANSMIT/RECEIVE PAIR REQUIRED FOR SIGNAL EXTENSION TO SECURITY SERVER.
TV:101:01	LCD COMMERCIAL DISPLAY	SAMSUNG	QB55R	60"	WALL - FIXED	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	OFE SIGNAGE DEVICE LOCATED BEHIND DISPLAY PROVIDED FOR VIEWING IN BREAK ROOM. DATA CONNECTIONS SHOWN ON TN DRAWINGS.

			AUDIO-VIDEO EQU	JIPMENT RACK SCHEDULE			
ID	RACK PR	OPERTIES	RACK UNITS	FURNISHED BY	INSTALLED BY	PROVIDED BY	NOTES
U	B.O.D. MANUF.	B.O.D. MODEL	RACK UNITS	FURNISHED BY	INSTALLED BY	PROVIDED BY	NOTES
R:108:01	MIDDLE ATLANTIC	BGR-4532	45	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	DIV. 27 AV CONTRACTOR	AV EQUIPMENT RACK TO SUPPORT DIGITAL SIGNAGE SYSTEMS AND FUTUE EQUIPMENT. RACK SHALL BE COORDINATED WITH NEIGHBORING TELECOM AND SECURITY EQUIPMENT IN-ROOM LADDER RACK AND PATHWATER FOR DIGITAL SIGNAGE SHALL BE PROVIDED BY DIV. 27 TELECOM CONTRACTOR. REFER TO TN DRAWING FOR ADDITIONAL INFORMATION.



3151 NW PARAGON PKWY

Project No.:		19050.02		
Date:		08/06/2021 PERMIT SET		
		REVISIONS		
No.	Date	Description		
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		-		

REGISTRATION

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS

ARCHITECTURE

HENDERSON

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / LAND3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTURAL ENGINEERS

ENGINEERS

PLUMBING

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR FOGEL ANDERSON



EXPIRES 12/31/2021

SHEET TITLE

AUDIO-VIDEO SCHEDULES

SHEET NUMBER

TA4.01

TELECOMMUNICATIONS SYMB	OLS					
THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBR STANDARD MOUNTING HEIGHTS	PATHWAYS	SECURITY IP END-POINT DEVICES	ROU	JGH-IN OUTLETS		V2.00 GENERAL NEW WORK NOTES
TELECOM BACKBOARD (BOTTOM OF BACKBOARD) LADDER RACK IN TELECOM ROOMS (BOTTOM OF DEVICE) 90" CARLET TRACK (CONDUIT A FO (BOTTOM OF DATHWAY)	W"xH (W"=WIDTH, "H"=HEIGHT)	REFER TO TY-SERIES DRAWINGS FOR SEC	CARLE(C)	ROUGH-IN ON		READ THE SPECIFICATIONS AND REVIEW DRAWINGS OF ALL DIVISIONS OF WORK. COORDINATE THIS WORK WITH ALL OTHER DIVISIONS OF WORK AND ALL SUPPONTED OF THE PROPERTY OF THE PROP
CABLE TRAY / CONDUIT AFC (BOTTOM OF PATHWAY) LIGHT FIXTURE IN TELECOM ROOMS (BOTTOM OF DEVICE) TELEPHONE WALL OUTLET (CENTERLINE) 48"	VERTICAL CABLE TRAY UNDERGROUND CONDUIT	SYMBOL DESCRIPTION CEILING SECURITY CAMERA	1 REFER TO TY-SERIES R FF	FURNITURE FEED, WALL BOX ROUGH-IN	BACK BOX CONDUIT 2-GANG BACKBOX WITH (2) 2" EMT 2" GROMMET	2. ALL WORK SHALL CONFORM TO THE APPLICABLE SPECIFICATIONS
DATA WALL OUTLET SAME AS ADJACENT DEVICE, UNO TELEVISION OUTLET REFER TO ARCH DRAWINGS TMGB/TGB (CENTERLINE)	(#) D" ("#"=QUANTITY, "D"=CONDUIT DIAMETER) CONDUIT	WALL SECURITY CAMERA WALL MOUNT EMERGENCY PHONE	1 REFER TO TY-SERIES 1 REFER TO	ROUGH-IN	REFER TO SCHEDULE IN (2) 1-1/4" EMT SPECIFICATIONS REFER TO SCHEDULE IN EMT TO ACCI	PRE-ESTABLISHED STRUCTURED CABLING STANDARDS; SHOULD ESS DIFFERENCES EXIST IN THE SPECIFICATIONS RELATING TO
WALL CLOCK (CENTERLINE) 84" INTERCOM (CENTERLINE) 48"	(#) D" ("#"=QUANTITY, "D"=CONDUIT DIAMETER) CABLE SUPPORTS OR J-HOOKS	PEDESTAL STYLE EMERGENCY PHONE	1 REFER TO TY-SERIES RS	THROUGH ROUGH-IN AUDIO-VIDEO SPEAKER,	SPECIFICATIONS CEILING INSTALL AV PROVIDER'S (1) 3/4" EMT SPEAKER BACK CAN	TECHNOLOGY AND THE CLIENT'S PRE-ESTABLISHED STANDARDS THE CONTRACTOR SHALL CONTACT THE LOW VOLTAGE ENGINEER FOR CLARIFICATION THROUGH THE RFI PROCESS.
USE THE DEFAULT MOUNTING HEIGHTS SHOWN ABOVE UNO IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ARE ABOVE FINISHED FLOOR (AFF) OR ABOVE FINISHED GRADE (AFG) TO BOTTOM OF	CABLE SUPPORTS OR 3-HOORS CONDUIT SLEEVE	AUDIO-VIDEO IP END-POINT DEVICES REFER TO TA-SERIES DRAWINGS FOR	RS	AUDIO-VIDEO SPEAKER, WALL ROUGH-IN	INSTALL AV PROVIDER'S (1) 3/4" EMT SPEAKER BACK CAN 2-GANG BACKBOX WITH (2) 1-1/2" EMT	3. FULLY COORDINATE ALL CABLE TRAY, FIRE STOP CONDUITS /
OUTLET BOX. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.	(#) D" ("#"=QUANTITY, "D"=CONDUIT DIAMETER) FS UL FIRESTOP SYSTEM ASSEMBLY	SYMBOL DESCRIPTION	CABLE(S) DETAIL RTV	CEILING ROUGH-IN AUDIO-VIDEO TELEVISION,	2-GANG COVER PLATE 2-GANG BACKBOX WITH (2) 1-1/2" EMT	COORDINATE CABLE TRAY AND CONDUIT INSTALLATIONS WITH
ABBREVIATIONS A AMPERES LAN LOCAL AREA NETWORK	PB L"XW"XH" PULL BOX ("L"=LENGTH, "W"=WIDTH, "H"=HEIGHT)	AUDIO-VIDEO CONTROL PANEL OUTLET TH 1D TELEVISION CEILING OUTLET	1 REFER TO RAV	AUDIO-VIDEO PLATE, CEILING ROUGH-IN	2-GANG COVER PLATE 2-GANG BACKBOX WITH (2) 1-1/2" EMT 2-GANG COVER PLATE	CONCRETE SLAB OR UNDER SLAB (WHERE CONDUIT WOULD BE ON GRADE) REQUIRES THE USE OF WET LOCATION RATED CABLES.
ADA AMERICANS WITH LCC LIMITED COMBUSTIBLE CABLE DISABILITIES ACT LEC LOCAL EXCHANGE CARRIER	SC SPLICE RISER DIAGRAMS	T# 1D TELEVISION CEILING OUTLET 1D TELEVISION WALL OUTLET	TA-SERIES RAV 1 REFER TO TA-SERIES R MP	ROUGH-IN AUDIO-VIDEO MICROPHONE,	2-GANG BACKBOX WITH (2) 1-1/2" EMT 2-GANG COVER PLATE 2-GANG BACKBOX WITH (2) 1-1/2" EMT	4. ALL TELECOMMUNICATIONS CONTINUOUS PATHWAYS SHALL BE BONDED TO THE TELECOMMUNICATIONS BONDING BACKBONE; FOR
AFC ABOVE FINISHED CEILING LED LIGHT-EMITTING DIODE AFF ABOVE FINISHED FLOOR LF LINEAR FEET AFG ABOVE FINISHED GRADE MAN METROPOLITAN AREA	FIBER OPTIC CROSS CONNECT	P# 1D PROJECTOR CEILING OUTLET	1 REFER TO TA-SERIES REL	WALL ROUGH-IN SECURITY ELECTRIFIED LOCK, ROUGH-IN	DÓOR FRAMI	E BONDING BUSHING SHALL BE USED AT THE END CLOSEST TO THE
AHJ AUTHORITY HAVING NETWORK JURISDICTION MATV MASTER ANTENNA ANSI AMERICAN NATIONAL TELEVISION	COPPER UTP CROSS CONNECT		RCR	WALL ROUGH-IN	1-GANG BACKBOX WITH (1) 3/4" EMT 1-GANG COVER PLATE 1-GANG BACKBOX WITH (1) 3/4" EMT	SERVING TR. CONTRACTOR TO REFER TO THE ANSI-STD-J 607 STANDARD FOR ADDITIONAL INFORMATION AS TO THE INSTALLATION OF THE TELECOMMUNICATIONS BONDING BACKBONE.
STANDARDS INSTITUTE MC MAIN CROSS-CONNECT AP ACCESS POINT MDF MAIN DISTRIBUTION FRAME AV AUDIO-VIDEO MFR MANUFACTURER	P 110-TYPE PROTECTOR BLOCK		R CAN	WALL ROUGH-IN SECURITY CAMERA, CEILING	1-GANG COVER PLATE INSTALL SECURITY PROVIDER'S BACKBOX	5. ALL FIRE RATED WALL / FLOOR ASSEMBLIES PENETRATED FOR TELECOMMUNICATIONS CABLING PATHWAYS SHALL BE FIRE
AWG AMERICAN WIRE GAUGE BAS BUILDING AUTOMATION SYSTEM MH MAINTENANCE HOLE MM MULTIMODE MPOE MAIN POINT OF ENTRANCE	PATCH PANEL PATCH PANEL		R CAN	SECURITY CAMERA, WALL ROUGH-IN	1-GANG BACKBOX WITH (1) 1" EMT 1-GANG COVER PLATE	STOPPED WITH THE APPROVED FIRE STOP SYSTEMS (F/S). ALL FIRESTOP SYSTEMS SHALL BE INSTALLED AS DIRECTED BY THE MANUFACTURER AND AS SPECIFIED IN DIVISION 07 07 84 00 -
BBC BACKBONE BONDING MPOP MAIN POINT OF PRESENCE CONDUCTOR MTD MOUNTED BD BUILDING DISTRIBUTOR N/A NOT APPLICABLE	SBB SECONDARY BONDING BUSBAR (SBB)		(R) IC	ROUGH-IN SECURITY INTERCOM, WALL	1-GANG BACKBOX WITH (1) 1" EMT 1-GANG COVER PLATE 1-GANG BACKBOX WITH (1) 1" EMT	"FIRESTOPPING". FIRE STOP ASSEMBLY LOCATIONS ARE TO BE COORDINATED WITH CABLE TRAY PATHWAY TO TELECOMMUNICATIONS ROOM.
BDF BUILDING DISTRIBUTION NEC NATIONAL ELECTRICAL CODE FRAME NFPA NATIONAL FIRE PROTECTION	PBB PRIMARY BONDING BUSBAR (PBB)		R KP	SECURITY KEYPAD, WALL ROUGH-IN	1-GANG COVER PLATE 1-GANG BACKBOX WITH (1) 1" EMT 1-GANG COVER PLATE	6. BACK BOXES AND CONDUIT LOCATIONS IN PRECAST CONCRETE
BFC BELOW FINISHED CEILING C CONDUIT NIC NOT IN CONTRACT CAT CATEGORY NM NANOMETER	TELECOMMUNICATIONS BACKBONE CABLING		R PB	WALL ROUGH-IN SECURITY MOTION DETECTOR,	1-GANG BACKBOX WITH (1) 1" EMT 1-GANG COVER PLATE 1-GANG BACKBOX WITH (1) 1" EMT	WALLS SHALL BE COORDINATED WITH ARCHITECT, STRUCTURAL ENGINEER, AND GC PRIOR TO ORDERING THE PRECAST WALLS.
CATV COMMUNITY ANTENNA NRTL NATIONALLY RECOGNIZED TELEVISION TESTING LAB CCTV CLOSED CIRCUIT OC ON CENTER	TELECOMMUNICATIONS BACKBONE CABLING — — (REFER TO RISER DIAGRAM FOR MORE INFORMATION) TELECOMMUNICATIONS ROOM		(R) MD	CEILING ROUGH-IN SECURITY MOTION DETECTOR,	1-GANG COVER PLATE 1-GANG BACKBOX WITH 1-GANG COVER PLATE	7. ROUTING OF CABLES SHALL BE CONCEALED. CABLES SHALL BE ROUTED IN CONDUIT IN EXPOSED AREAS. MINIMIZE AMOUNT OF EXPOSED CONDUIT BY EMBEDDING CONDUIT IN SLAB WHEN
TELEVISION OSHA OCCUPATIONAL SAFETY AND CD CAMPUS DISTRIBUTOR HEALTH ADMINISTRATION CMP COMMUNICATIONS PLENUM OSP OUTSIDE PLANT	LADDER RACK	TELECOMMUNICATIONS RESPONSIBILITY	MATRIX	, W.L. TOOO.T. III		POSSIBLE. EMBEDDED CONDUITS AND PENETRATIONS OF STRUCTURE SHALL FOLLOW DETAILS IN STRUCTURAL DRAWINGS. WHEN CONDUITS CAN ONLY BE INSTALLED EXPOSED, NOTIFY
JACKET PBB PRIMARY BONDING BUSBAR CMR COMMUNICATIONS RISER PBX PRIVATE BRANCH EXCHANGE JACKET POE POWER OVER ETHERNET	PRIMARY BONDING BUSBAR (PBB) - WALL ELEVATION VIEW					ARCHITECT PRIOR TO START OF INSTALLATION OF CONDUITS. CABLES SHALL BE ROUTED IN CONDUIT WHEN ABOVE HARD CEILINGS. CONDUITS FOR ELEVATOR PHONES AND FIRE ALARM
DAS DISTRIBUTED ANTENNA PON PASSIVE OPTICAL NETWORK SYSTEM POTS PLAIN OLD TELEPHONE			Fur	rnish Ins	stall	CONTROL PANEL SHALL BE CONTINUOUS (HOMERUN) FROM THE TELECOMMUNICATIONS ROOM TO THE APPLICABLE BOX / CABINET.
DEMO DEMOLITION PSTN PUBLIC SWITCHED (E) EXISTING TELEPHONE NETWORK	ELEVATION VIEW					CONTRACTOR SHALL SIZE AND PROVIDE CONDUITS TO MEET TIA-569. 8. TELECOMMUNICATIONS ROOMS SHALL BE DEDICATED FOR
EC ELECTRICAL CONTRACTOR QTY QUANTITY ECIA ELECTRONIC COMPONENTS RCDD REGISTERED INDUSTRY ASSOCIATION COMMUNICATIONS	PBB/SBB - PLAN VIEW	Description	Future Construction Package Team	Owner Construction Team	Owner Comments	INFORMATION TECHNOLOGY USE (I.E. NO SHARED SPACE WITH A JANITOR, FIRE ALARM SYSTEM, ETC.) NO SERVICES SHALL PASS THROUGH THE SPACE UNLESS DEDICATED TO THE SPACE (NO
EMI ELECTROMAGNETIC DISTRIBUTION DESIGNER INTERFERENCE RMC RIGID METAL CONDUIT EMS ENERGY MANAGEMENT RU RACK UNIT	TELECOM BACKBOARD					PLUMBING, MECHANICAL, ELECTRICAL, FIRE, ETC.)
SYSTEM SBB SECONDARY BONDING EMT ELECTRICAL METALLIC BUSBAR TUBING SCS STRUCTURED CABLING	TWO-POST EQUIPMENT RACK	General Communications Grounding and Bonding	X	X		
ER EQUIPMENT ROOM SYSTEM ETR EXISTING TO REMAIN SF SQUARE FEET FAAP FIRE ALARM ANNUNCIATOR SM SINGLEMODE	FOUR-POST EQUIPMENT RACK	Hangers and Supports Conduits and Backboxes Underground pathways for utility entrance	X X X	X X X		
PANEL SPECS SPECIFICATIONS FACP FIRE ALARM CONTROL TBB TELECOMMUNICATIONS PANEL BONDING BACKBONE	EQUIPMENT CABINET (REFER TO PLAN NOTES ON ENLARGED PLANS FOR MORE INFORMATION)	Firestops, Conduit Sleeves, and Sleeve Seals Structured Cabling	X	X		
FD FLOOR DISTRIBUTOR TBD TO BE DETERMINED FMC FLEXIBLE METAL CONDUIT TIA TELECOMMUNICATIONS	ENLANGED I LANG I GIV MORE INI GIVINATION)	Telecom Room Cabinets, Racks, Frames, and Enclosures Telecom Room Buildout (ex. backboard and ladder rack)	X	X		
FS FIRE STOP SYSTEM INDUSTRY ASSOCIATION FLR FLOOR TR TELECOMMUNICATIONS ROOM F/UTP SCREEN TWISTED PAIR TYP TYPICAL		Telecom Room Uninterruptible Power Supply (UPS) Telecom Room Power Strips Optical Fiber Patch Cables	X	X		
(SHIELDED) UNO UNLESS NOTED OTHERWISE GC GENERAL CONTRACTOR UL UNDERWRITER GYP GYPSUM BOARD LABORATORIES, INC.		Copper Patch Cables Optical Fiber Backbone Cable and Connectivity	X	X		
HC HORIZONTAL CROSS- CONNECT HCM HORIZONTAL CABLE UPS UNINTERRUPTIBLE POWER SUPPLY U/UTP UNSHIELDED TWISTED PAIR	TELECOMMUNICATIONS OUTLETS SYMBOL DESCRIPTION CABLE(S) DETAIL	Copper Backbone Cable and Connectivity Optical Fiber Horizontal Cable and Connectivity Copper Horizontal Cable and Connectivity	X X X	X X X		
MANAGER V VOLT(S) HH HAND HOLE VCM VERTICAL CABLE MANAGER Hz HERTZ W WIRE	□ DATA WALL OUTLET □ 1 1/TN5.00	Data Communications Router / Firewall	X			
IMC INTERMEDIATE METAL WAN WIDE AREA NETWORK CONDUIT WAO WORK AREA OUTLET IP INTERNET PROTOCOL WAP WIRELESS ACCESS POINT	\bigcirc 2D DATA WALL OUTLET 2 1/TN5.00 \bigcirc 3D DATA WALL OUTLET 3 1/TN5.00	Core Switch / Edge Switch Wireless Access Points	X			
ISP INTERNET SERVICE WP WEATHER PROOF PROVIDER WR WEATHER RESISTANT	 □ DATA WALL OUTLET BEHIND TV AND ADJACENT TO POWER. 	Servers / Storage and Backup Laptops / Desktops / Copiers / Printers / Scanners		X	X	
ISP INSIDE PLANT CABLE WT WATERTIGHT JB JUNCTION BOX XP EXPLOSION-PROOF J-BOX JUNCTION BOX	Arr 2D DATA WALL OUTLET, ABOVE COUNTER 2 1/TN5.00 $ Arr$ 4D DATA WALL OUTLET, ABOVE COUNTER 4 1/TN5.00	Voice Communications VolP Gateway / Analog handsets VolP handsets		X	X	
ANNOTATION		VoIP Network licensing		X	X	
1 TECHNOLOGY PLAN CALLOUT	© 2D SYSTEMS FURNITURE DATA OUTLET 2 2/TN5.00					
EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR INSTALLED)	\bigcirc 3D SYSTEMS FURNITURE DATA OUTLET 3 2/TN5.00 \bigcirc 4D SYSTEMS FURNITURE DATA OUTLET 4 2/TN5.00					
	2D MULTI-SERVICE FLOOR BOX WITH DATA AND POWER OUTLETS, SEE E-SERIES 2 3/TN5.00					
DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER. LOWER NUMBER INDICATES SHEET NUMBER	DRAWINGS FOR FLOOR BOX TYPE MULTI-SERVICE FLOOR BOX WITH DATA AND POWER OUTLETS, SEE E-SERIES AND POWER OUTLETS, SEE E-SERIES					
1 SECTION CUT DESIGNATION	DRAWINGS FOR FLOOR BOX TYPE DATA CEILING OUTLET 1 4/TN5.00					
DEDICATED EQUIPMENT ACCESS TILE	DATA CEILING OUTLET 2 4/TN5.00 TELEPHONE, VoIP WALL OUTLET 1 5/TN5.00					
ACCESS PANEL	♥ W,1D TEEET HONE, VOII WALL GOTTET					
LINETYPE LEGEND						
THROUGHOUT THE DRAWINGS DIFFERENT LINE-TYPES ARE USED IN COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS						
EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF THE NEW WORK AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE. THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE VIEW						
IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING, WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES.						
ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE						
OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC.	_					
EXISTING NEW DEMOLISH — — — — — — FUTURE						CALL OUTS
						ENLARGED PLAN CALLOUT
						NOT IN COORE
						NOT IN SCOPE



3151 NW PARAGON PKWY

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		-			
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REGISTRATION

PROJE	CT TEAM
ARCHITECT	FINKLE+WILLIAMS ARCHITECTURE
CIVIL	GBA
LANDSCAPE	HOERR SCHAUDT / LAND3
FOUNDATIONS	BSE STRUCTURAL ENGINEERS
STRUCTURAL	BSE STRUCTURAL ENGINEERS
PLUMBING	HENDERSON ENGINEERS
MECHANICAL	HENDERSON ENGINEERS
ELECTRICAL	HENDERSON ENGINEERS
FIRE PROTECTION	HENDERSON ENGINEERS
CONTRACTOR	FOGEL ANDERSON

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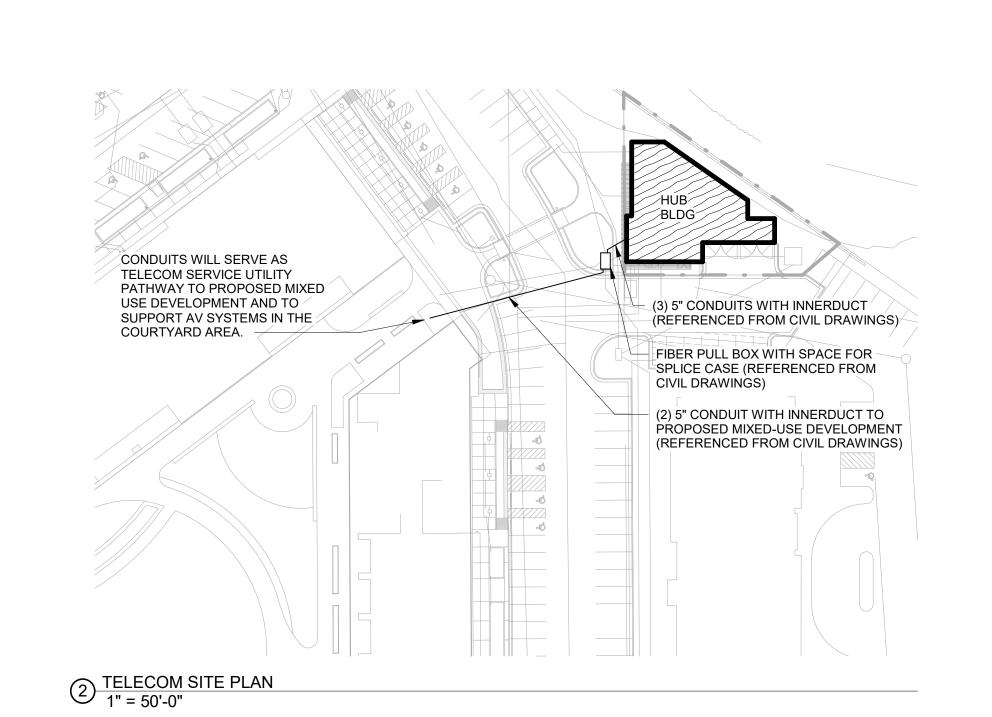
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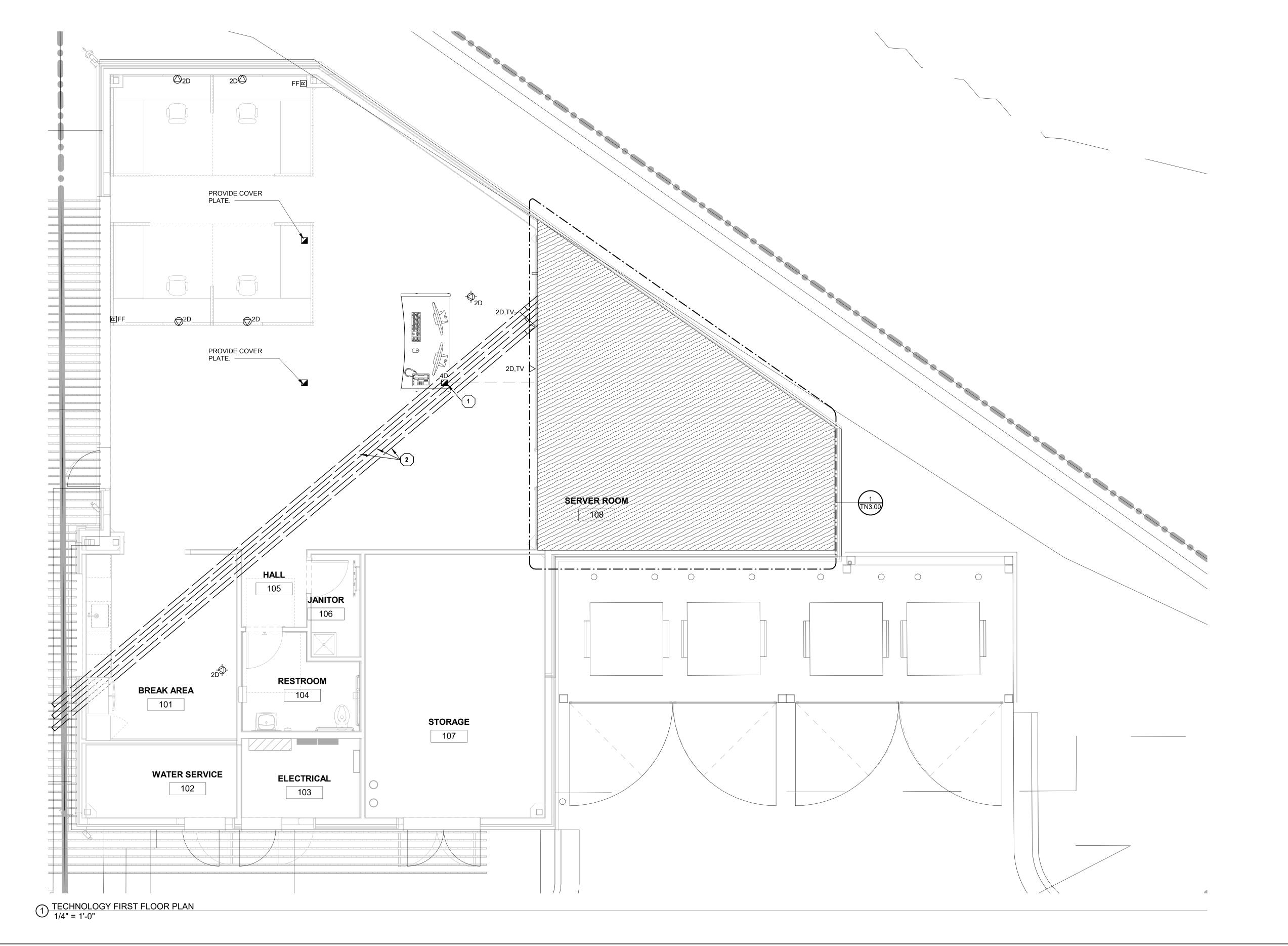
EXPIRES 12/31/2021

TECHNOLOGY
GENERAL
NOTES AND
LEGEND

SHEET NUMBER

TN0.00







TECHNOLOGY PLAN NOTES:

SEE E-SHEETS FOR FLOOR BOX TYPE AND CONDUIT
 REQUIREMENTS. PROVIDE OSP CATEGORY 6 WHEN IN OR
 BELOW SLAB.

2 (3) 5" UNDERGROUND PVC CONDUITS. SEE CIVIL DRAWINGS FOR CONTINUATION BEYOND 5'-0" OUTSIDE THE BUILDING.

LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY

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REGISTRATION

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / LAND3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTURAL ENGINEERS

PROJECT TEAM

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR FOGEL ANDERSON

HENDERSON ENGINEERS

HENDERSON

PLUMBING

MECHANICAL

HENDERSON
ENGINEERS

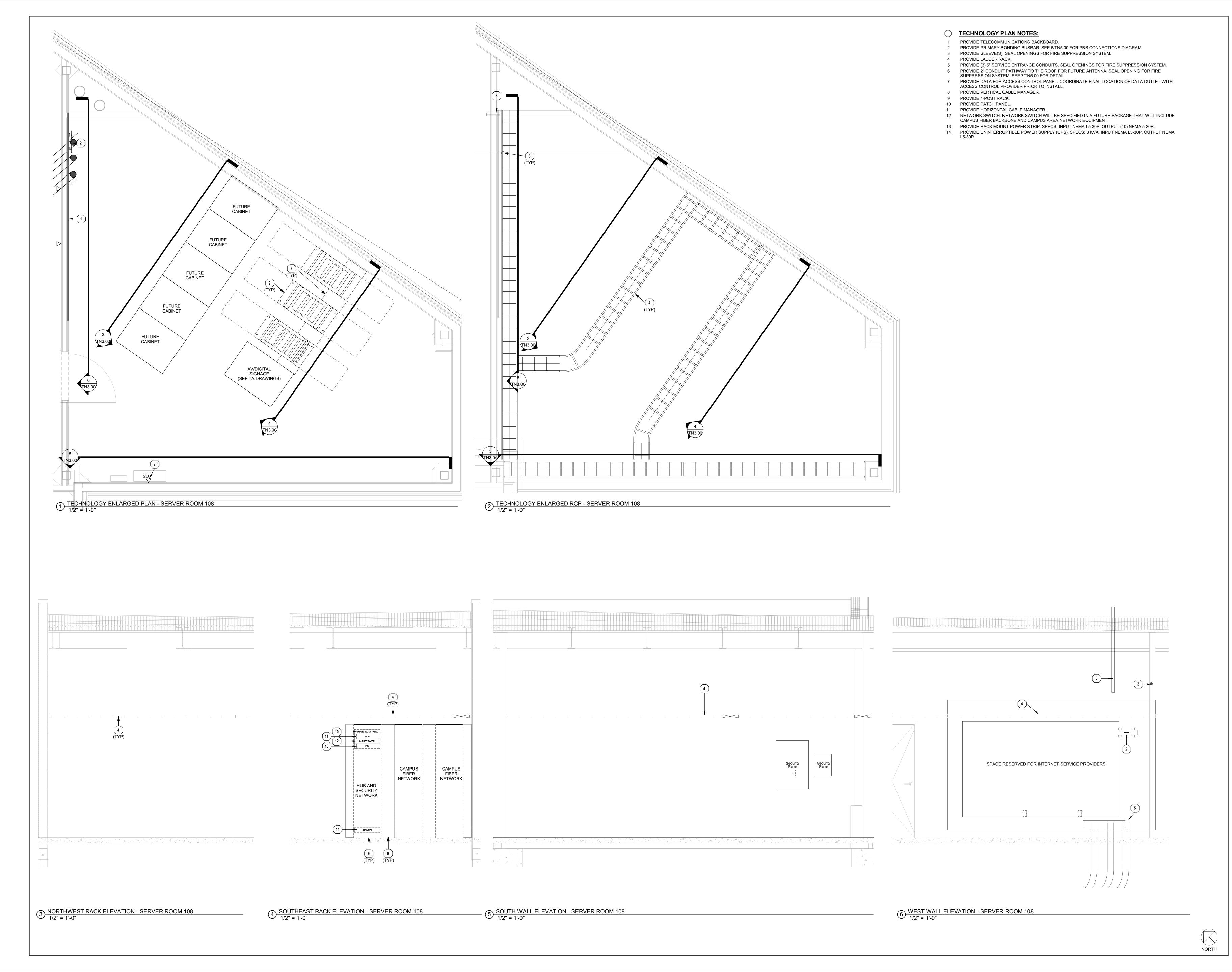
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EXPIRES 12/31/2021

SHEET TITLE

TECHNOLOGY FIRST FLOOR PLAN





3151 NW PARAGON PKWY

Project No.: 19050.02

Issued For: PERMIT SET

REVISIONS

No. Date Description

REGISTRATION

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / LAND3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTURAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR FOGEL ANDERSON

HENDERSON
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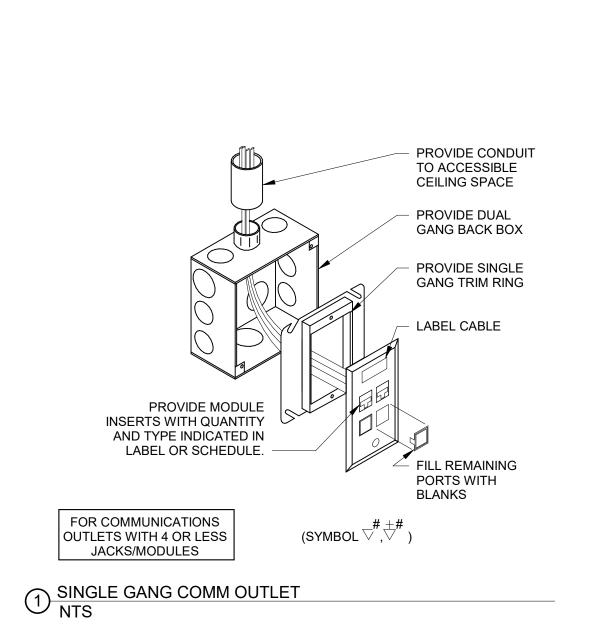
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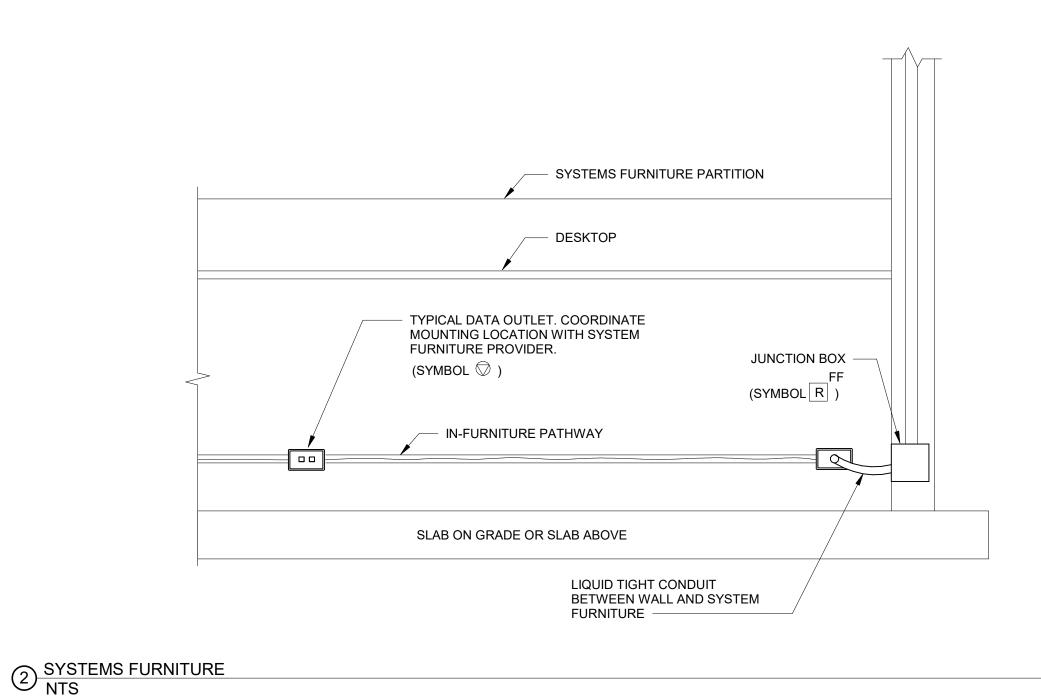
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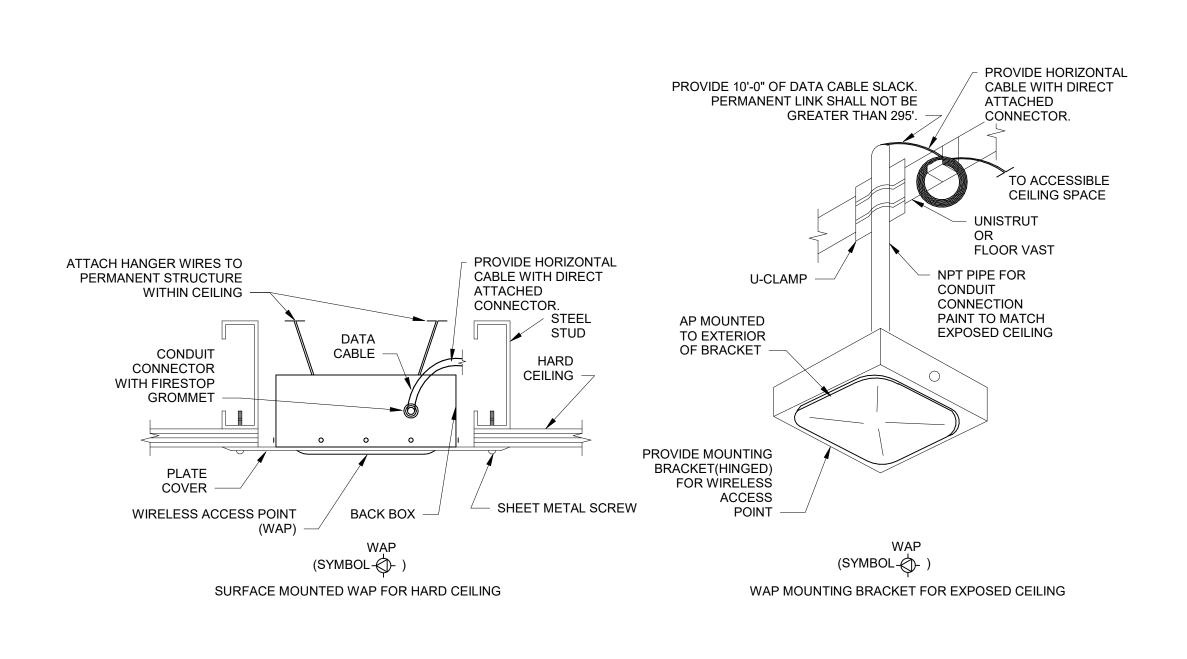
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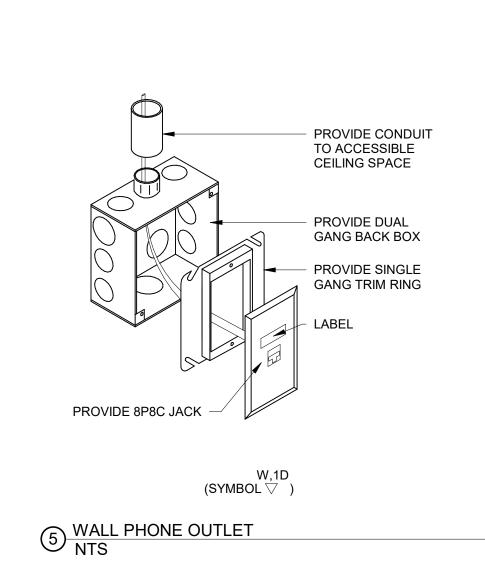
TECHNOLOGY ENLARGED PLANS

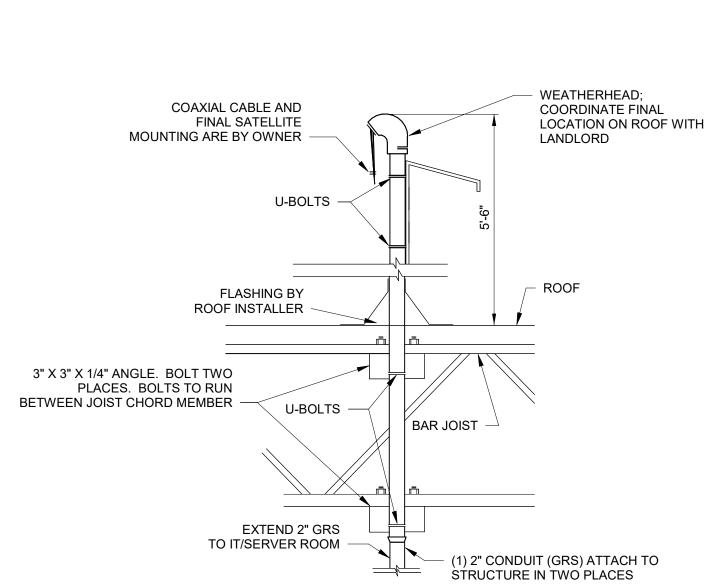
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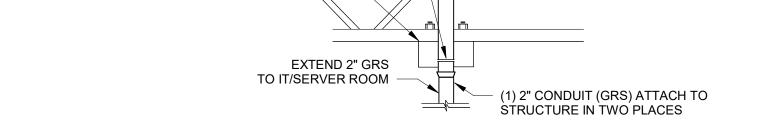


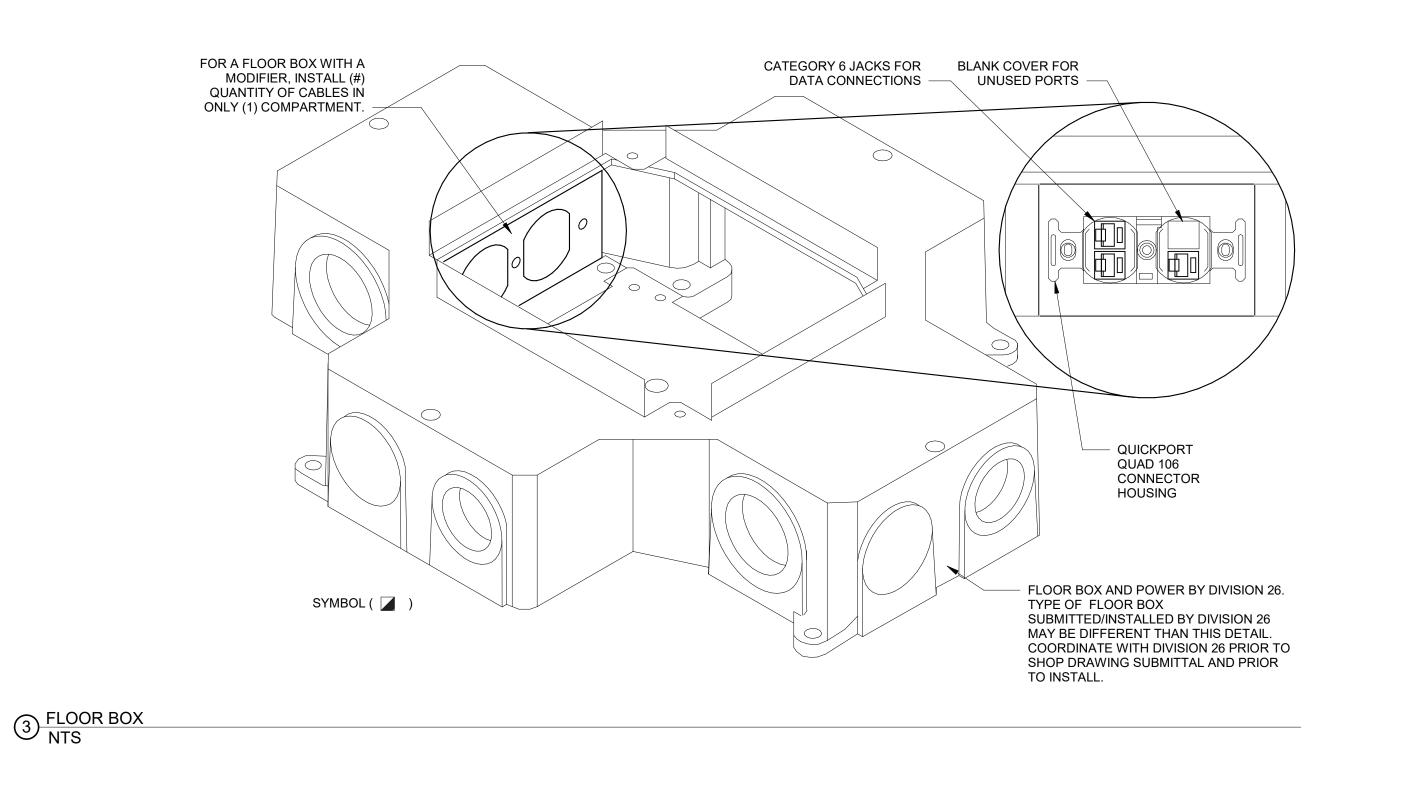


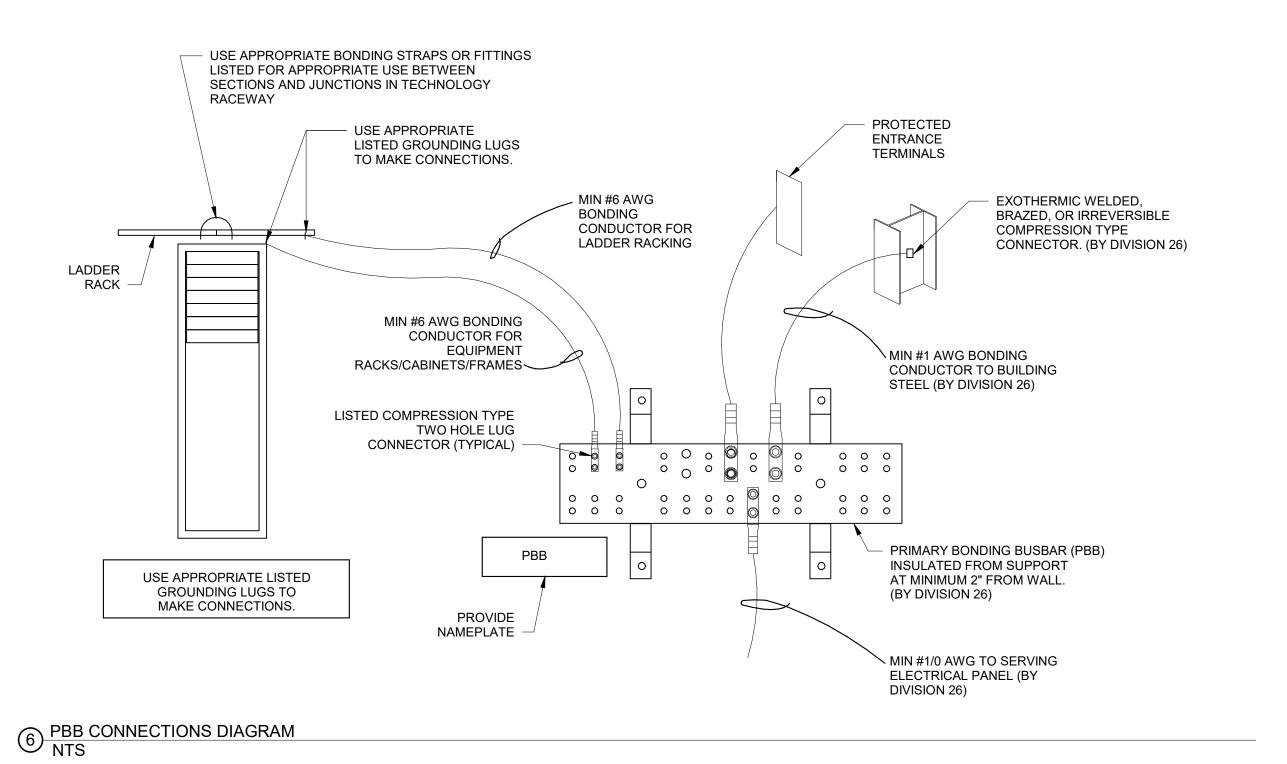


WIRELESS ACCESS POINT INSTALLATION NTS

7 ROOF WEATHERHEAD DETAIL NTS









LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY

Projec	ct No.:	19050.02		
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REGISTRATION

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT / FOUNDATIONS BSE STRUCTURAL

ENGINEERS BSE STRUCTURAL STRUCTURAL

ENGINEERS PLUMBING HENDERSON **ENGINEERS**

MECHANICAL HENDERSON **ENGINEERS**

ELECTRICAL **ENGINEERS** FIRE PROTECTION HENDERSON

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> > 1850004412 EXPIRES 12/31/2021

SHEET TITLE

TECHNOLOGY DETAILS

```
SECTION 27A: COMMON WORK FOR COMMUNICATIONS

    GENERAL

      WORK INCLUDED
Provide common work for the technology sub-systems for this construction project, consisting of the following components:
       Firestopping
        Outlet boxes
        Floor boxes and poke-throughs
        Cable supports
      Identification of these components
ensure that they are in compliance with the requirements stated or reasonably inferred by the contract documents.
```

Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation.

B. REFERENCES

Contractor shall meet the following standards and guidelines (latest editions): ANSI/TIA-569 "Commercial Building Standard for Telecommunications Pathways and Spaces

BICSI TDMM "Telecommunications Distribution Methods Manual" BICSI ITSIMM "Information Technology Systems Installation Methods Manual"

SUBMITTALS

Preconstruction submittals. Product cutsheets for firestopping, cable tray, floor boxes, poke-throughs, and cable support. Shop drawings indicating proposed conduit routing, pull box sizes and locations, dimensioned floor box and poke-thru locations, and all firestopping locations with product information and UL system called out at each firestop location.

Post construction submittals: As-built 'record drawings' – preconstruction shop drawings updated with any minor changes made in the field. Operation & maintenance instructions for firestopping, cable tray, and floor boxes/poke-throughs.

Regulatory Requirements: Provide products listed and classified by Underwriter's Laboratories, Inc. as suitable for the purpose intended.

PRODUCTS

Firestop Materials: Fire stop materials (fill void or cavity) - caulks, putty, composite sheets, restricting collars and strips used to seal penetrations of conduits through fire-rated floors, walls and partitions. Minimum performance requirements: shall meet testing requirements of ASTM E-814 or UL 1479; shall be installed in accordance with the NRTL fire stop system appropriate for the specific application and in accordance with manufacturer's instructions. Acceptable manufacturers: STI, Hilti, and 3m.

Firestop Devices; for sleeves through a single penetration (wall or floor); shall meet testing requirements of ASTM e-814 or UL, 1479; shall be installed in accordance with the NTRL fire stop system appropriate for the specific application and in accordance with manufacturer's instructions. Acceptable manufacturers: EZ-path family of products by STI; Hilti firestop speed sleeve CP 653 series. On shop drawings, identify location of every fire- or smoke-rated wall and floor penetration for communications conduit and cabling, along with firestopping manufacturer, product, and ul listing for that particular type of penetration/system. For example: STI SSS intumescent sealant, UL CAJ1259. Acceptable manufacturers: STI, Hilti, and 3m.

Conduits for Communications: Conduit - minimum conduit size shall be trade size 1 inch; uon. Indicate location, size, and quantity of all conduits and sleeves on shop drawings, including through-floor penetrations for cable feeds to poke-through devices. Refer to Division 26 for approved conduit type and manufacturers.

Outlet Boxes for Communications: For new stud walls, telecommunications outlet boxes shall be double-gang, with a minimum size (uon) of 4-11/16 inch x 4-11/16 inch x 2-5/8 inch deep (including extension ring). Manufacturer shall be Raco 258/259, Randl T-55017, or equivalent from Emerson/Appleton or Thomas &

For 6" or 8" deep masonry walls, telecommunications outlet boxes shall be 3-1/2" deep. Where drawings indicate single-gang faceplate, provide single-gang box, manufacturer Raco 695. Where drawings indicate dual-gang faceplate, provide dual-gang box, manufacturer Raco 696.

For ceiling telecommunications outlets (flush or above accessible ceiling as detailed on the drawings) – plenum-rated, dual-gang 4" square, 2-1/2" deep box, manufacturer shall be Raco 239, or equal from Emerson/Appleton or Thomas & Betts/Steel City.

For exterior locations, outlet boxes shall be aluminum die cast with 1" connection. Where drawings indicate single-gang faceplate, provide single-gang box, manufacturer Thomas & Betts ihd3-3 or equal from Emerson/Appleton or Hubbell/Raco. Where drawings indicate double-gang faceplate, provide double-gang box,

manufacturer Thomas & Betts 2ihd5-3 or equal from Emerson/Appleton Hubbell/Raco.

Where in-use weatherproof cover is indicated, provide flush mount cover, manufacturer Hubbell WP826MPHI or approved equivalent.

Cable Supports: Cable Supports (open-top hooks – a.k.a. j-hooks) used as horizontal pathways shall have a flat bottom and sufficient width to comply with the minimum bend radius of all cabling as required by the referenced standards and manufacturers recommendations. Manufacturer shall be B-line, Caddy, or pre-

Pull boxes: For interior applications only, communications pull boxes shall be NEMA 1 and sized per part 3 execution. Manufacturer shall be Hoffman, NEMA enclosures, Wiegmann, or approved equivalent. Identification of Communications Systems: All firestopping locations shall have a custom adhesive label (approximately 3" x 5") on both sides of the penetration.

Refer to Part 3 execution for more information. Conduit and pull box labels shall be mechanically-printed from a handheld labeler, with text 1/4" or 3/8" in height. Refer to Part 3 execution for more information. EXECUTION

Installation Requirements: Unless otherwise stated, where installation requirements identified in drawings and specifications conflict with the manufacturer's recommendations, the more restrictive standard shall apply. Bring to the attention of the owner and engineer conflicts between manufacturer's instructions and

Firestopping: Provide a label on both sides of all fire stop locations, indicating firestop manufacturer, installer and company, date installed, and UL system number with all relevant ratings indicated. Wherever cable tray routing encounters a rated wall, stop cable tray and provide firestop devices (sleeves) through rated wall. Capacity of firestop devices shall equal that of the cable tray. Wherever j-hook cable routing encounters a rated wall, provide firestop devices through rated wall. Capacity of firestop devices shall equal that of the installed cabling plus 25% spare capacity.

Conduit Requirements: Ream all conduit ends and fit them with an insulated bushing. Minimum bend radius for conduits is 6 times the diameter for 2 inches conduits or less and 10 times the diameter for conduits greater than 2 inches. Provide an accessible pullbox between every two 90 degree bends (or equivalent) in a conduit run. Pullboxes shall be sized per the BICIS TDMM. Indicate proposed and final pullbox locations on shop and as-built drawings.

Underground conduits serving slab-on-grade floorboxes shall stub up directly into the serving telecommunications room, UON on the drawings. Indicate proposed and final routing on shop and as-built drawings.

Leave a pull cord in all conduit installed for this division.

Pathway Distribution: Provide conduit to support cabling from outlet location to overhead accessible ceiling space, cable tray, or communications room. Refer to drawings and part 2 for minimum conduit size and additional requirements. All installed conduits shall utilize 40% fill ratio, to include 25% spare capacity; upsize conduits as necessary to meet this requirement. Indicate size and proposed/final routing of all conduits on shop and as-built drawings.

Provide cable supports (i.e. j-hooks) to support cabling above accessible ceilings every 5 feet or less. J-hooks shall be properly sized for initial cable load, plus 25% spare capacity. cable supports are not allowed above inaccessible ceilings or exposed ceilings; provide appropriately-sized conduit at those locations. Indicate proposed/final routing of all j-hook cable routing on shop and as-built drawings.

Pull boxes: Place pull boxes in conveniently accessible locations. No directional changes shall be allowed in pull boxes. Conduits shall enter/exit the pullbox on the

Size pull boxes per the following (width x length x depth):

3/4" or smaller – 4" x 4" x 2-1/8" 1" – 4" x 16" x 3" 1-1/4" - 6" x 20" x 3" 1-1/2" – 8" x 28" x 4" 2" - 8" x 36" x 4" 2-1/2" - 10" x 42" x 5" 3" – 12" x 48" x 5" 4" - 16" x 60" x 8"

Labeling: Label all conduit with either "Telecom", "AV", or "Security" according to the intended system use of the installed or future cabling. For wall stub-up locations, For conduits greater than 10', label both ends of conduit with far end location and room/number. Example – AV to AV Rack R01 (Room 029) FOR conduits that stub up directly into a communications room, label both ends of conduit with far end location and room/number. Far end label shall be inside floor box. Label pull boxes "telecom", "AB", or "Security" on the cover.

END OF SECTION 27A

DIVISION 27B: STRUCTURED CABLING SYSTEM

GENERAL INSTRUCTIONS

A. WORK INCLUDED

Provide complete structured cabling system and associated common work for this construction project, consisting of the following components:

Racks and accessories

Termination blocks and patch panels Patch cables

Uninterruptable power supplies and Power Strips

Horizontal copper cabling Faceplates and connectors

System testing and other project close-out requirements

Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the

B. REFERENCES

Contractor shall meet the following standards and guidelines (latest editions): ANSI/TIA-568 "Commercial Building Telecommunications Cabling Standard"

ANSI/TIA-569 "Commercial Building Standard for Telecommunications Pathways and Spaces" ANSI/TIA-606 "Administration Standard for Commercial Telecommunications Infrastructure"

installation. Ensure that they are in compliance with the requirements stated or reasonably inferred by the contract documents.

ANSI/TIA-607 "Generic Telecommunications Bonding and Grounding for Customer Premises" BICSI TDMM "Telecommunications Distribution Methods Manual" BICSI ITSIMM "Information Technology Systems Installation Methods Manual"

C. SUBMITTALS

Preconstruction submittals: Product cutsheets. Shop drawings indicating common work components, such as proposed conduit routing, pull box sizes and locations, dimensioned floor box and poke-thru locations, and all firestopping locations with product information and UL system called out at each firestop location. Each outlet is also to have proposed outlet/jack label Identification.

Post construction submittals: As-built 'record drawings, preconstruction shop drawings updated with any minor changes made in the field. Operation & maintenance information. Structured cabling warranty certificate. Test results, per Part 3.

Regulatory Requirements: Provide products listed and classified by Underwriter's Laboratories, Inc. as suitable for the purpose intended. Provide the following to meet NEC requirements: unlisted entrance cables shall not be routed exposed in the building for more than 50 feet; extend entrance conduits in intermediate or rigid metal conduit into the telecommunications entrance room. Plenum-rated horizontal and backbone cables are required wherever routed in return-air plenum spaces. Wet-rated horizontal and backbone cables are required wherever routed in wet or damp locations (as defined in the NEC) and shall transition to plenum-rated cables wherever they enter a return-air plenum space; provide an appropriately-sized transition point enclosure.

Advanced Structured Cabling System Warranty: All components of the structured cabling system shall be covered by a manufacturer warranty for a period of at least 15 years. This warranty shall cover materials, equipment and workmanship, as well as the performance of the system for all current and future applications.

D. MANUFACTURERS

The following manufacturers are conditionally approved for the structured cabling system:

Commscope Hubbell

Leviton

Ortronics Panduit Siemon

E. PRODUCTS AND MATERIALS

Grounding and Bonding: Provide a complete functioning telecommunications grounding and bonding system in compliance with the TIA-607 "Generic Telecommunications Bonding and Grounding for Customer Premises". Major components include: PBB mounted in the server room. TBC connects the PBB to the main electrical service ground. Equipment and pathway grounding and bonding connections, recommended by manufacturers or equipment installed under this section, and stipulated in the referenced standard. Manufacturer of conductors shall be Harger or approved equivalent from list of manufacturers on electrical sheet specifications. Manufacturer of ground bars, connectors, and terminals shall be Harger, Panduit or approved equivalent. Submit product

Racks and Accessories: 4-Post Rack - height shall be approximately 7'-0". Mounting rails shall be spaced 19" wide. Ladder Rack - color shall be black. Width shall be 12" with rung space of 12". Provide vertical cable managers and horizontal cable managers as indicated on drawings. Submit product information for

Termination Blocks and Patch Panels: Category 6 patch panels – modular panels shall be provided complete with mounting hardware, jacks, retainers, wire guides, designation strips, and etc. Provide port quantity to support number of communications modules/jacks at work area outlets plus 25% spare. Submit product information for approval.

Patch Cables: Provide Category 6 cable lengths and quantities as required to patch switches and work area equipment. Assume 100% port activation. Turn over to Owner prior to substantial completion. All components shall be from the manufacturer offering the advanced system warranty. Submit product

Uninterruptable power supplies and Power Strips: See enlarged drawings for specifications. Submit product information for approval.

Horizontal Copper Cabling: Category 6 cabling – shall be 4-pair, plenum rated, color – Match painted ceiling in open office. Manufacturer shall be an approved cable vendor of the advanced system warranty manufacturer. Submit product information for approval.

Communications Faceplates and Connectors: Provide category 6 jacks, housed in a 4-port or 6-port faceplate; Faceplate material and color shall match electrical faceplates. Vacant ports in the faceplate shall be filled with the blank inserts matching faceplate color. Submit product information for approval.

General: Unless otherwise stated, where installation requirements identified in drawings and specifications conflict with the manufacturer's recommendations, the more restrictive standard shall apply. Bring to the attention of the owner and engineer conflicts between manufacturer's instructions and construction

Grounding and Bonding for Telecommunications: Provide and install an individual ground wire from each equipment rack/cabinet/frame in the room, as well as from the cable tray in the corridor and the ladder rack overhead. Where structural steel is available, install one individual ground wire from the TMGB/TGB. Where an electrical panel is located in the same room, install one individual ground wire from the TGB to the electrical panel ground bus.

Size conductors per the following table (Table 1 from TIA-607):

linear feet – awg size less than 13' - awg 6

F. EXECUTION

14-20' – awg 4 21-26' – awg 3

27-33' – awg 2 34-41' – awg 1

42-52' - awg 1/0

53-66' – awg 2/0 67-84' – awg 3/0

85-105' - awg 4/0 106-125' - 250 kcmil 126-150' - 300 kcmil

151-175' – 350 kcmil 176-250' - 500 kcmil

251-300' - 600 kcmil Greater than 300' – 750 kcmil

Cabling System: The drawings indicate the general location of the provisions for the cables required for the building. Coordinate final locations with the Architect. All cable shall be run parallel and perpendicular to structure. Diagonal or shortest path runs shall not be accepted unless specified or shown on drawings. Cables running together in parallel shall be aggregated by type into single uniform bundles. Multiple parallel runs of cable shall not be accepted unless indicated in the drawings or these specifications.

Cables shall be supported by approved pathway along their entire length. Cable support devices shall be securely attached to the building structure. Do not use mechanical, electrical, plumbing systems, ceiling tiles, or ceiling support wires for cable support unless instructed to do so.

Maintain bend radii appropriate for the performance standard and type of cable. Cables shall not be installed or routed in any manner that violates the manufacturer's specifications. Minimum bend radius for cables during installation is 20 times the cable diameter. Minimum bend radius for cables following installation is 10 times the cable diameter.

Maintain continuous jacket integrity on all cabling up to the outlet.

Maintain cable twists to termination contacts to 1/4 inch or less.

Leave a minimum 5 foot service loop above the outlet and 10 feet of slack in the telecommunications room for all horizontal cabling.

Label all cables within 6 inches of each end with a machine printed labels using the scheme detailed on the drawing.

Label all patch panel ports and fiber cross connect positions with machine printed labels using the scheme detailed below. Install all cabling according to BICSI cabling standards and practices.

Fully protect incoming conductors which are considered to have lightning exposure in accordance with NEC Chapter 8.

G. ACCEPTANCE TESTING

Operational testing: after installation of cables and connectors, demonstrate product capability and compliance with contract requirements. Test each signal path for end-to-end performance from each end of all pairs/strands installed. Remove temporary connections when tests have been satisfactorily completed. Horizontal copper cable procedures: inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bi-directional, category 6 tester. Test for faulty connectors, splices, and terminations. Test according to TIA TSB-67, transmission performance specifications for field testing of unshielded twisted-pair cabling systems. Link performance for UTP cables shall meet minimum criteria of TIA-568. Test reports are to include: wire map, length, insertion loss, next, PSNEXT, ELFEXT, PSLFEXT, return loss, propagation delay, and delay skew. Copies of all test reports, in both pdf and database format, shall be turned over to engineer and owner as a condition of final acceptance. Jack identification labels shall correspond to final as-built drawings.

Fiber optic cable procedures: visually inspect each fiber end face at 50x magnification. Refinish fibers with visible defects. perform end-to-end, bi-directional attenuation (loss) test for each multimode fiber strand at 850 and 1300 nanometers and for each single mode fiber strand at 1310 and 1550 nanometers. Conduct tests in accordance with TIA-526 standard and per test instrument manufacturer instructions. Demonstrate that measured link loss does not exceed the allowable "worst case" loss per the TIA-568 standard.

Cable test results shall include: project name, date of preparation, ID of work area outlet, date of test, contractor's name, media type, make/model/serial number of test equipment used, date of last calibration, names of test crew, serving telecom room number, category or type of cable being test, and test data

Grounding and bonding system testing: test all metallic ground/bonding wires install under this division. Test the grounding conductor and terminal connectors for total resistance between the equipment item being grounding and the main telecommunications grounding point in the room. This resistance shall be less

Invite Owner and Engineer to witness cable testing. Owner reserves the right to request the contractor conduct a random re-test of up to 5% of the cable plant to confirm documented test results. If more than 5% of these randomly tested cables do not pass, contractor shall correct the issue(s) and is responsible for retesting of 100% of the cable plant.

END OF SECTION 27B



3151 NW PARAGON PKWY



FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL HOERR SCHAUDT / LANDSCAPE FOUNDATIONS BSE STRUCTURAL

ENGINEERS

HENDERSON

ENGINEERS

PROJECT TEAM

STRUCTURAL BSE STRUCTURAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS**

MECHANICAL

ELECTRICAL HENDERSON **ENGINEERS** FIRE PROTECTION HENDERSON

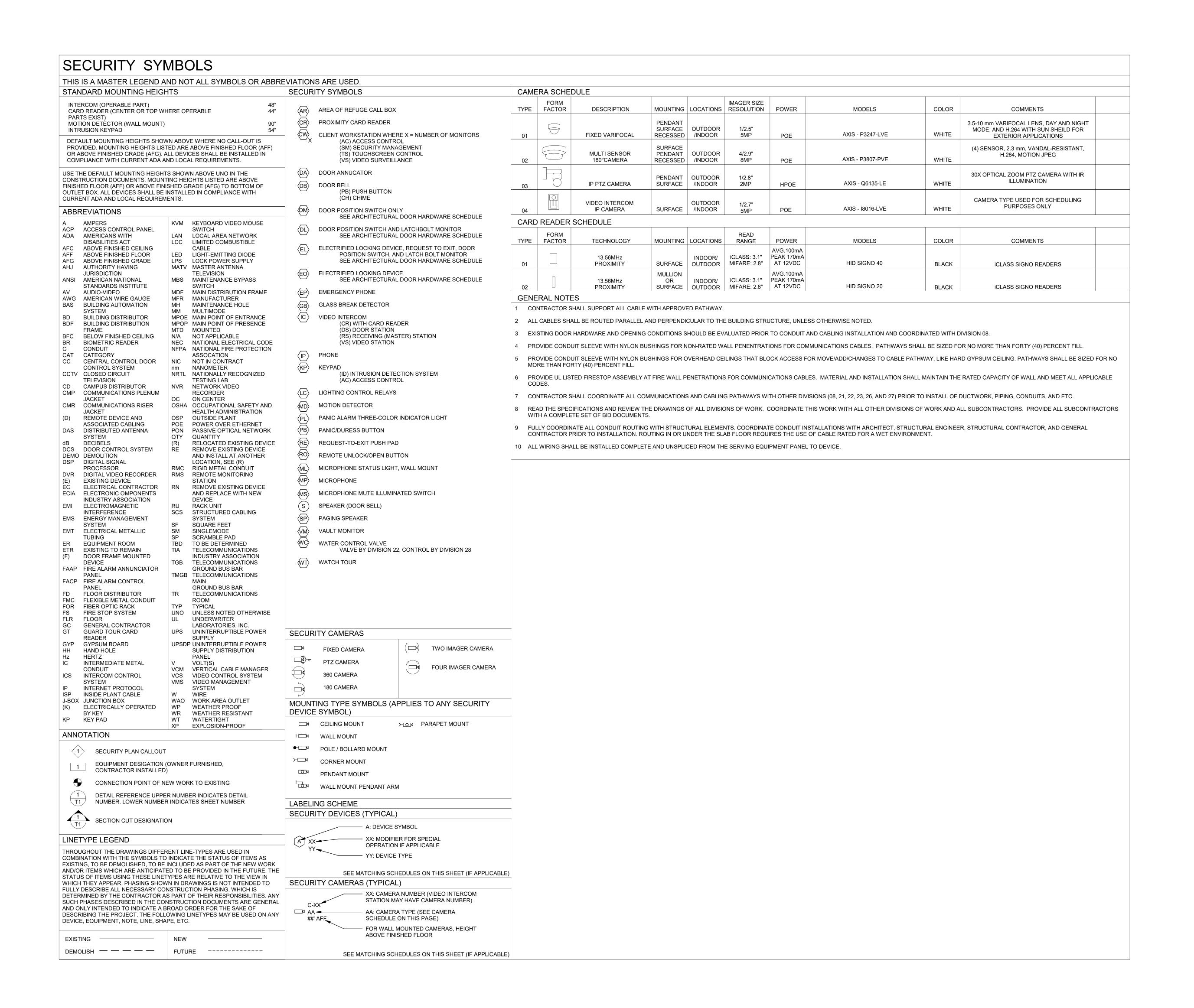
CONTRACTOR FOGEL ANDERSON

HENDERSON ENGINEERS LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412

EXPIRES 12/31/2021

SHEET TITLE

TECHNOLOGY





3151 NW PARAGON PKWY

Date:		08/06/2021	
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ARCHITECT FINKLE+WILLIAMS ARCHITECTURE CIVIL GBA LANDSCAPE HOERR SCHAUDT / FOUNDATIONS BSE STRUCTURAL **ENGINEERS** STRUCTURAL BSE STRUCTURAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON **ENGINEERS** ELECTRICAL HENDERSON **ENGINEERS** FIRE PROTECTION HENDERSON **ENGINEERS**

PROJECT TEAM



CONTRACTOR FOGEL ANDERSON

SHEET TITLE
SECURITY
GENERAL
NOTES AND
LEGEND

SHEET NUMBER

TY0.00





3151 NW PARAGON PKWY

Project No.: 19050.02 Issued For: PERMIT SET

REVISIONS

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PROJECT TEAM FINKLE+WILLIAMS ARCHITECT

ARCHITECTURE

CIVIL

LANDSCAPE HOERR SCHAUDT / LAND3

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STRUCTURAL BSE STRUCTURAL

ENGINEERS PLUMBING HENDERSON

ENGINEERS MECHANICAL HENDERSON

ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON ENGINEERS

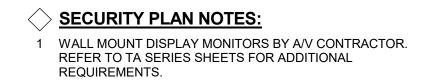
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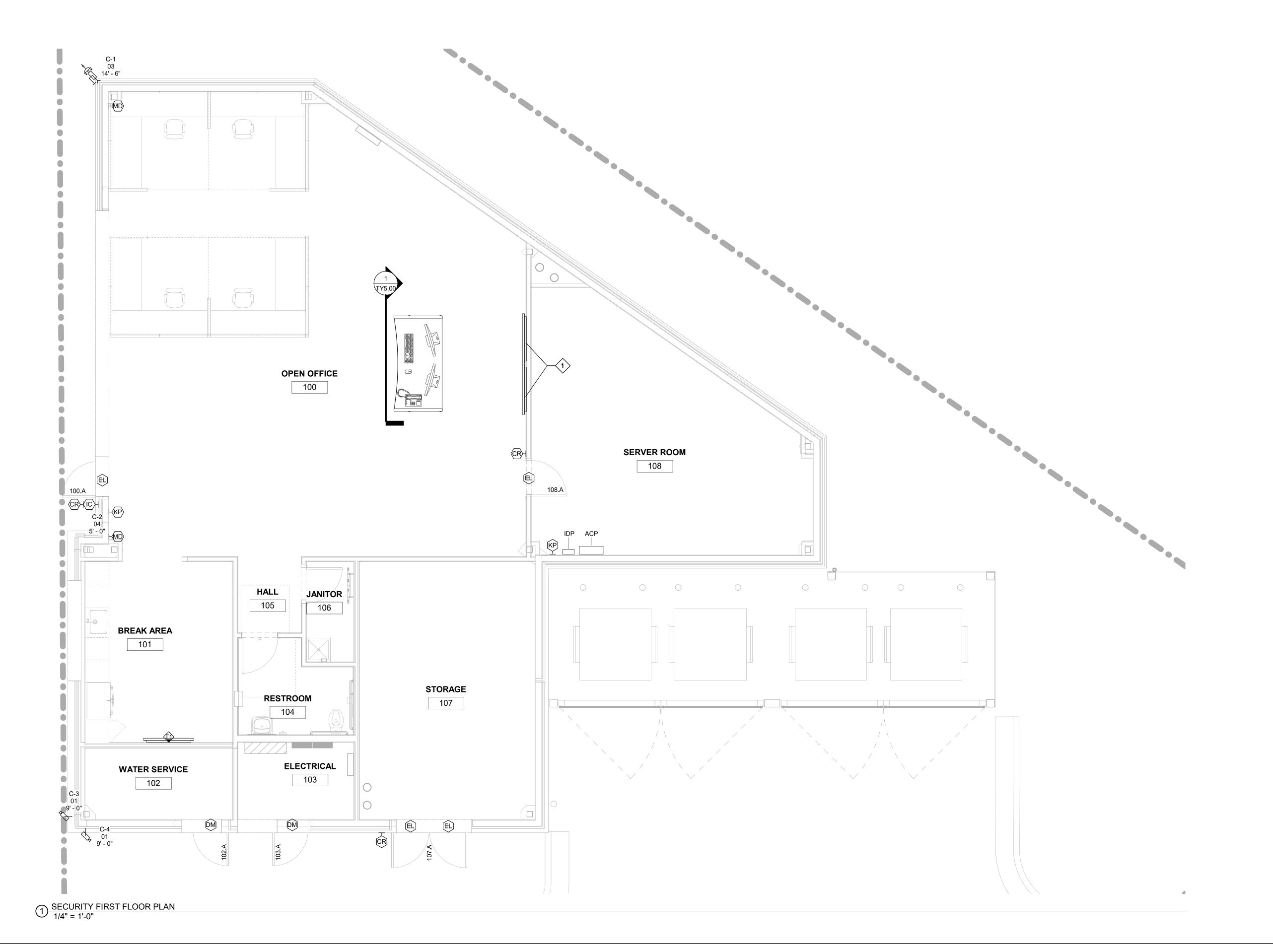
HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412

EXPIRES 12/31/2021

SHEET TITLE

SECURITY SITE PLAN







Project No.: 19050.02

3151 NW PARAGON PKWY

Date: 08/06/2021

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REGISTRATION

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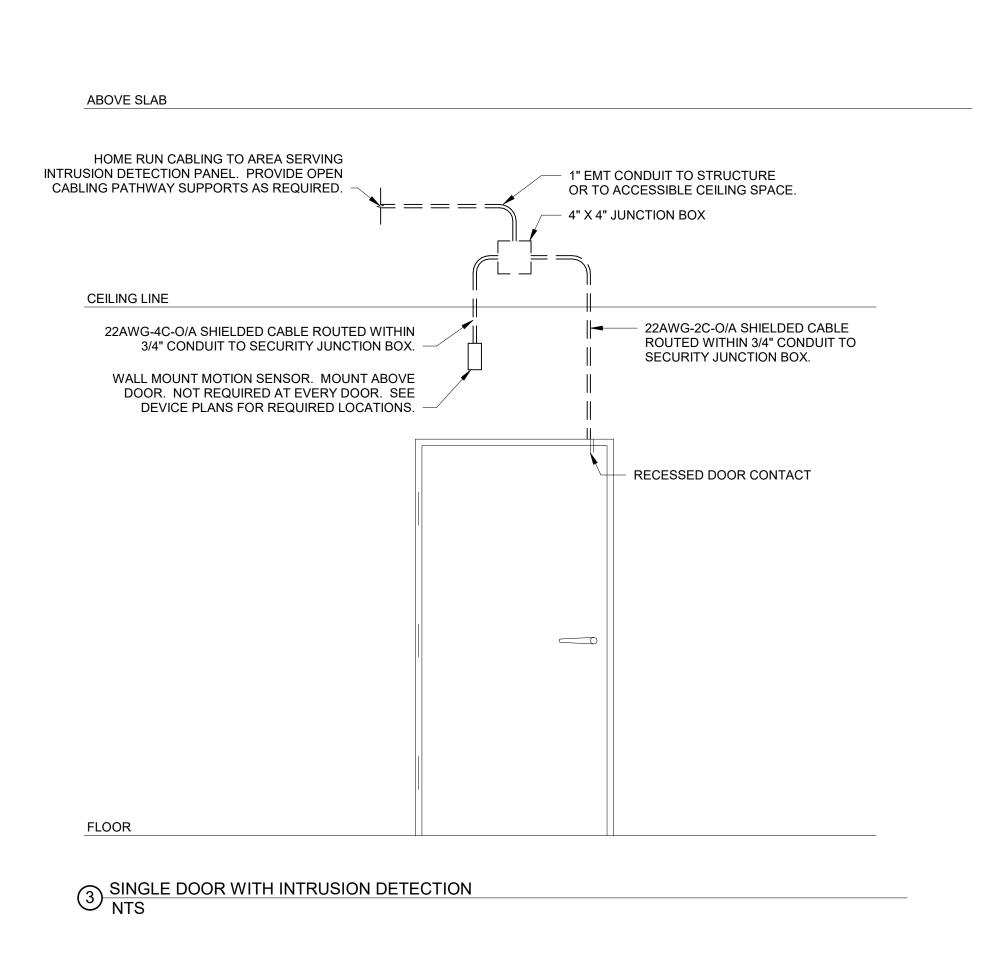
EXPIRES 12/31/2021

SHEET TITLE

SECURITY FIRST FLOOR PLAN

SHEET NUMBER

TY1.01



ROUTE CONDUIT TO

LOW-VOLTAGE CABLE

TRAY OR AS INDICATED ON THE FLOOR PLAN

PLASTIC BUSHING

- WALL MOUNTED SECURITY CAMERA. SEE CAMERA

SCHEUDLE FOR CAMERA TYPE.

ACCESSIBLE

CEILING

(SYMBOL ├□□□)

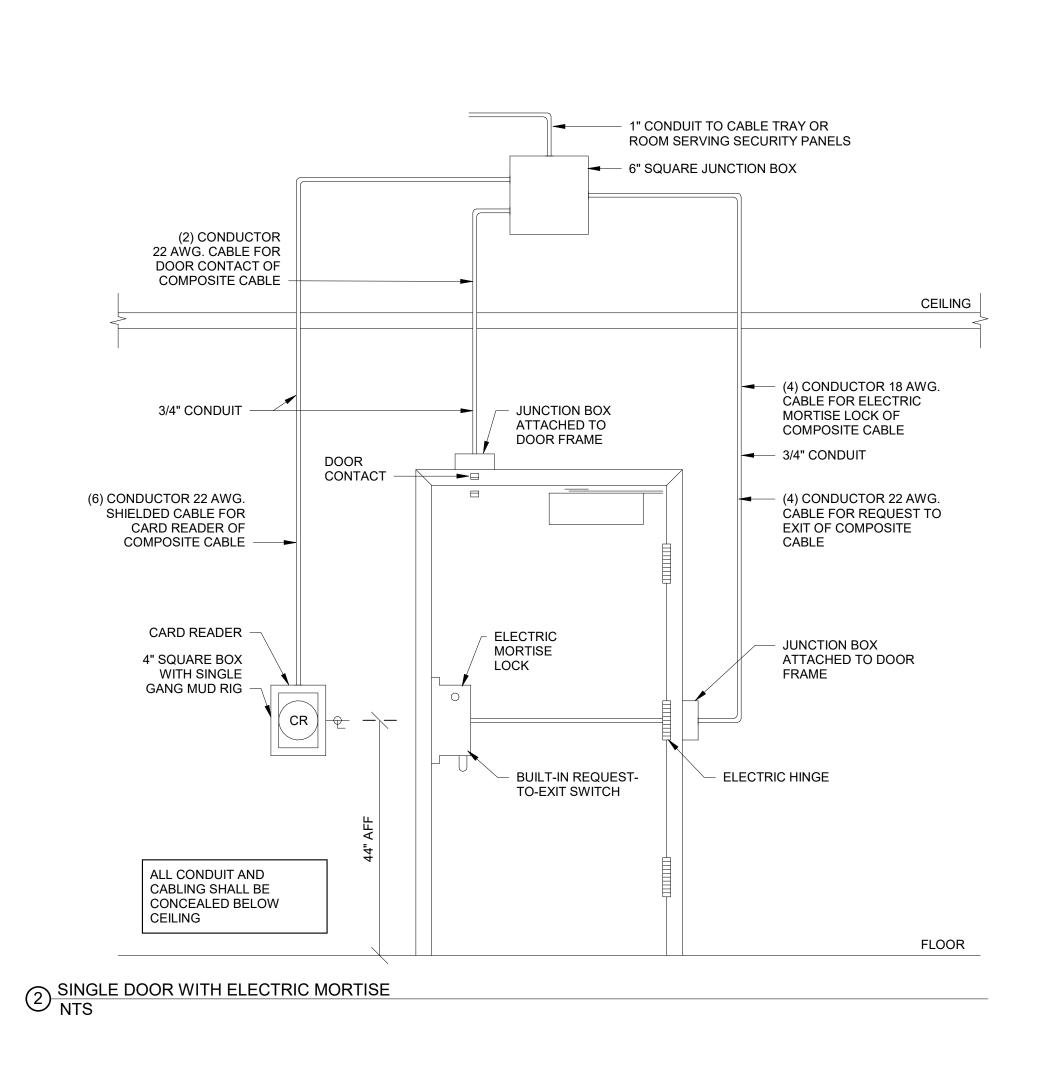
3/4" CONDUIT

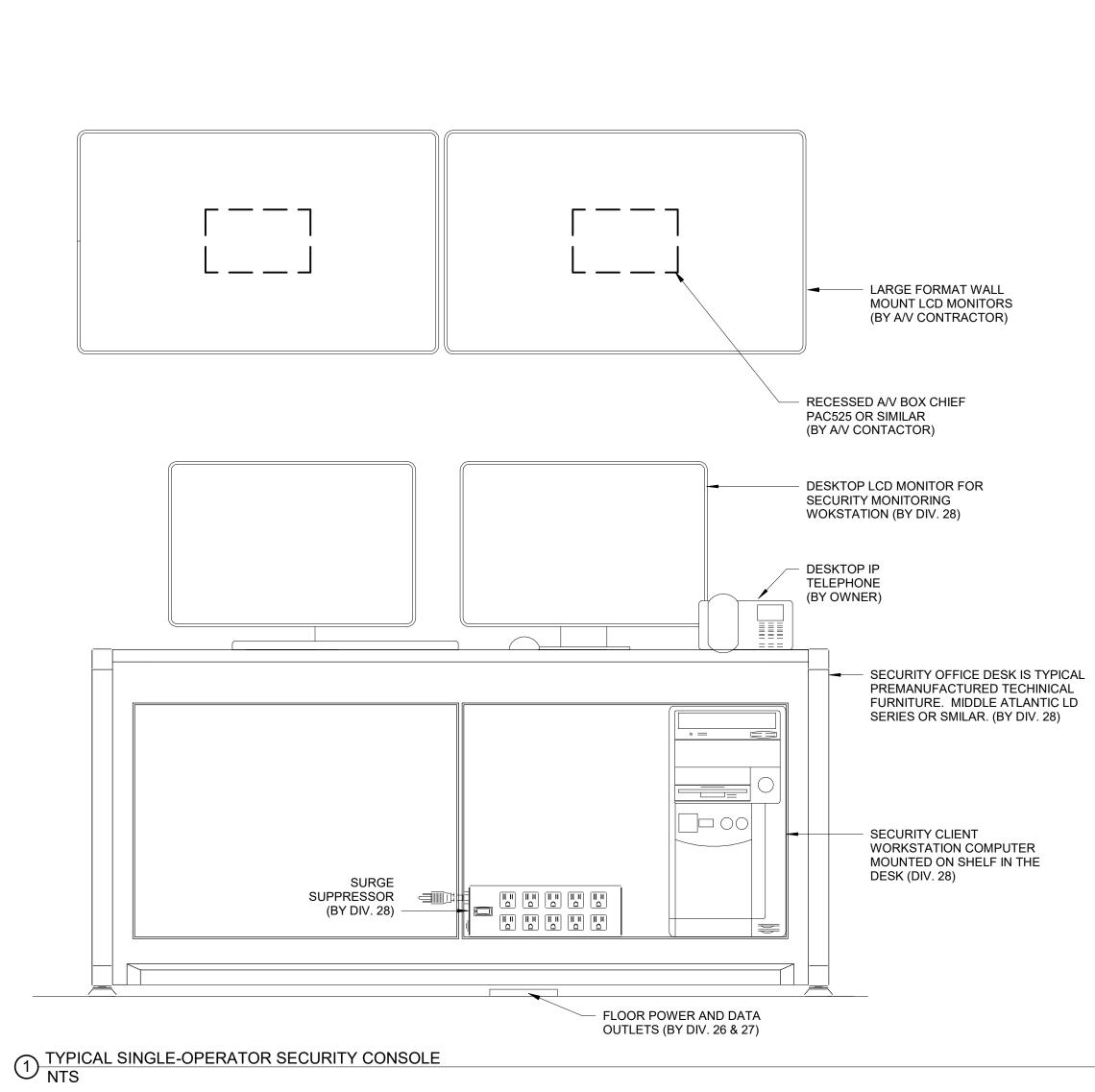
4" SQUARE BACK BOX WITH MUD RING; DEPTH SHALL MATCH

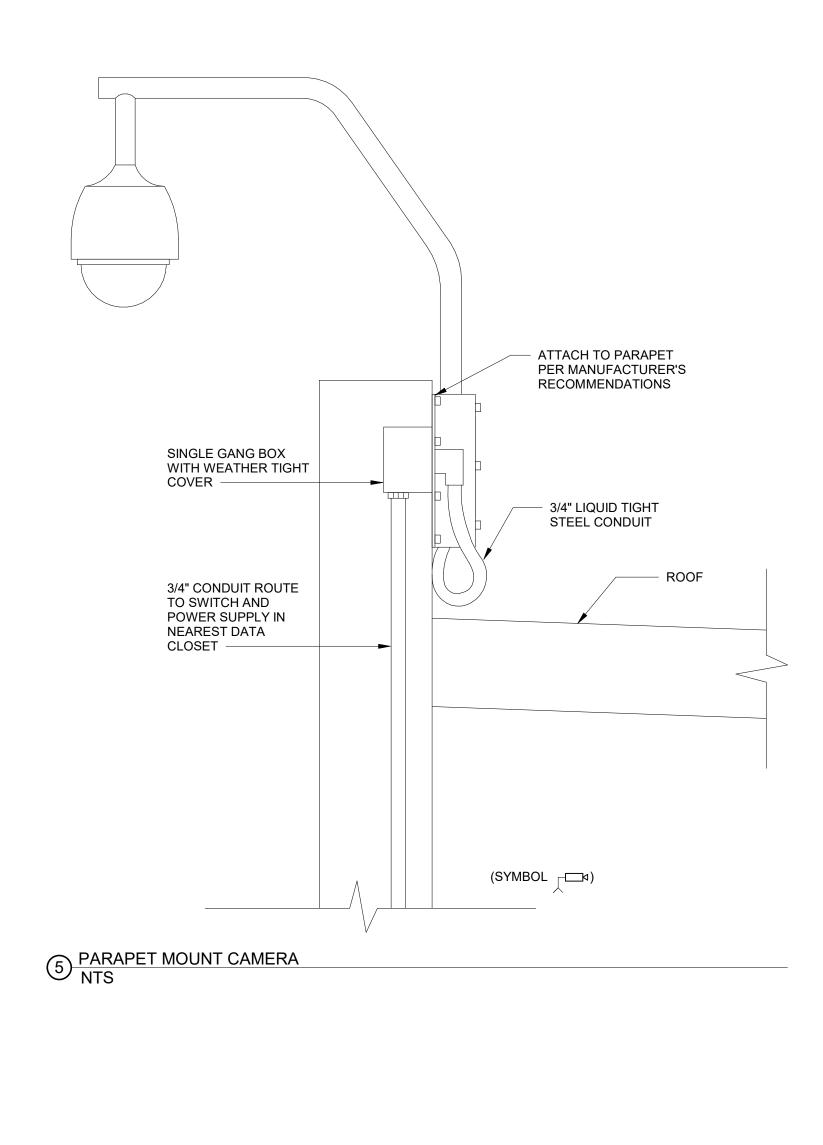
FINISH WALL. PROVIDE CAMERA ELECTRICAL BOX MOUTING

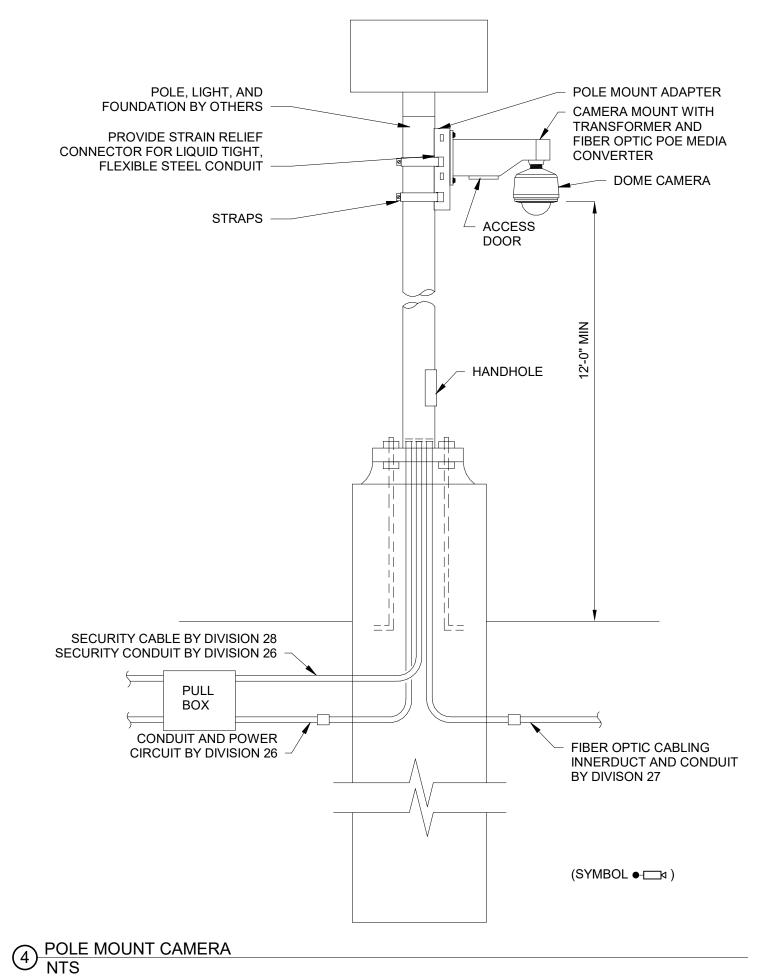
ACCESSORY.

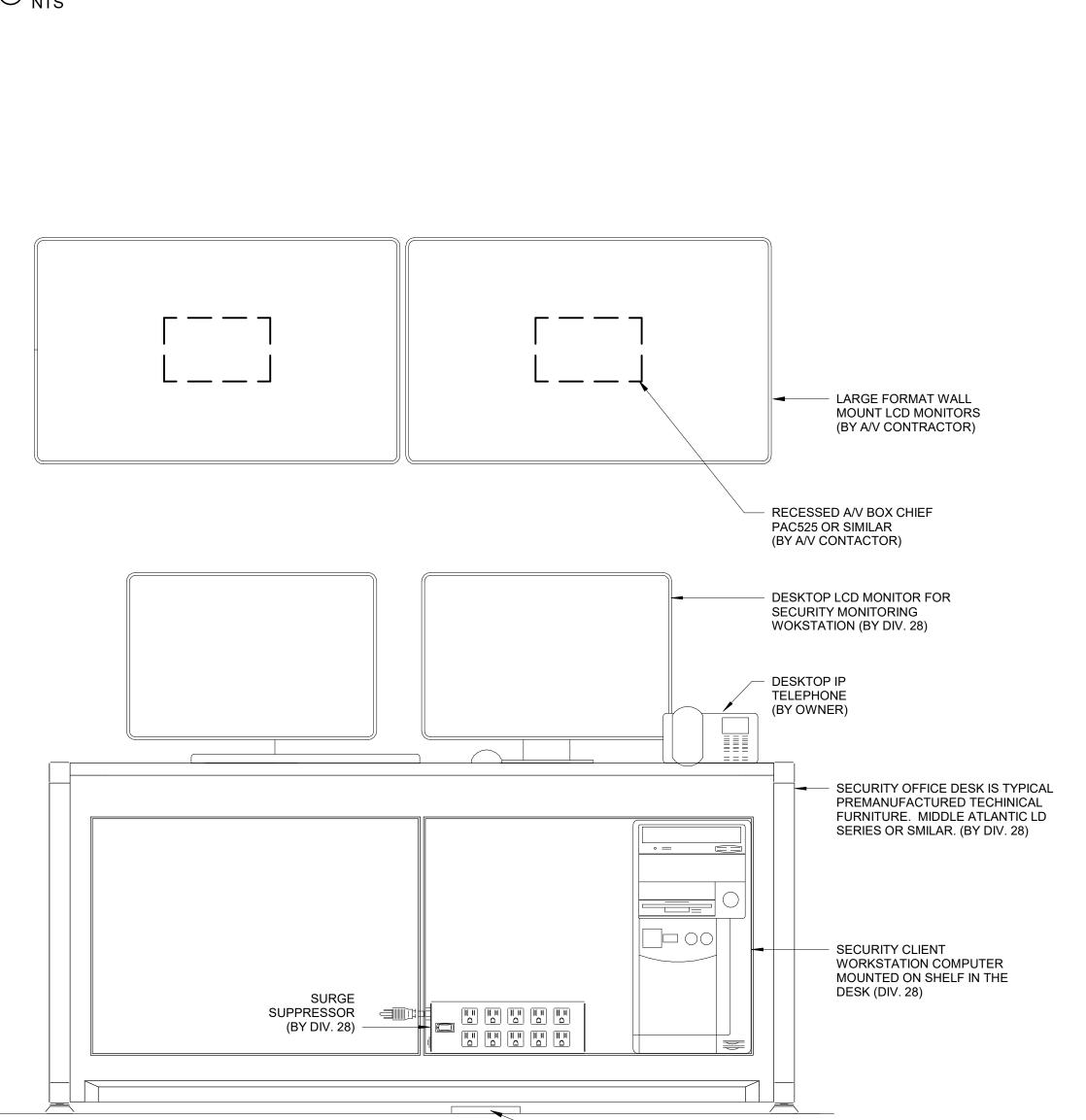
6 TYPICAL CAMERA INSTALLATION DETAIL - WALL MOUNT NTS













LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY

Date:		08/06/2021	
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PROJE	PROJECT TEAM					
ARCHITECT	FINKLE+WILLIAMS ARCHITECTURE					
CIVIL	GBA					
LANDSCAPE	HOERR SCHAUDT LAND3					
FOUNDATIONS	BSE STRUCTURAL ENGINEERS					
STRUCTURAL	BSE STRUCTURAL ENGINEERS					
PLUMBING	HENDERSON ENGINEERS					
MECHANICAL	HENDERSON ENGINEERS					
ELECTRICAL	HENDERSON ENGINEERS					
FIRE PROTECTION	HENDERSON ENGINEERS					
CONTRACTOR	FOGEL ANDERSON					



EXPIRES 12/31/2021

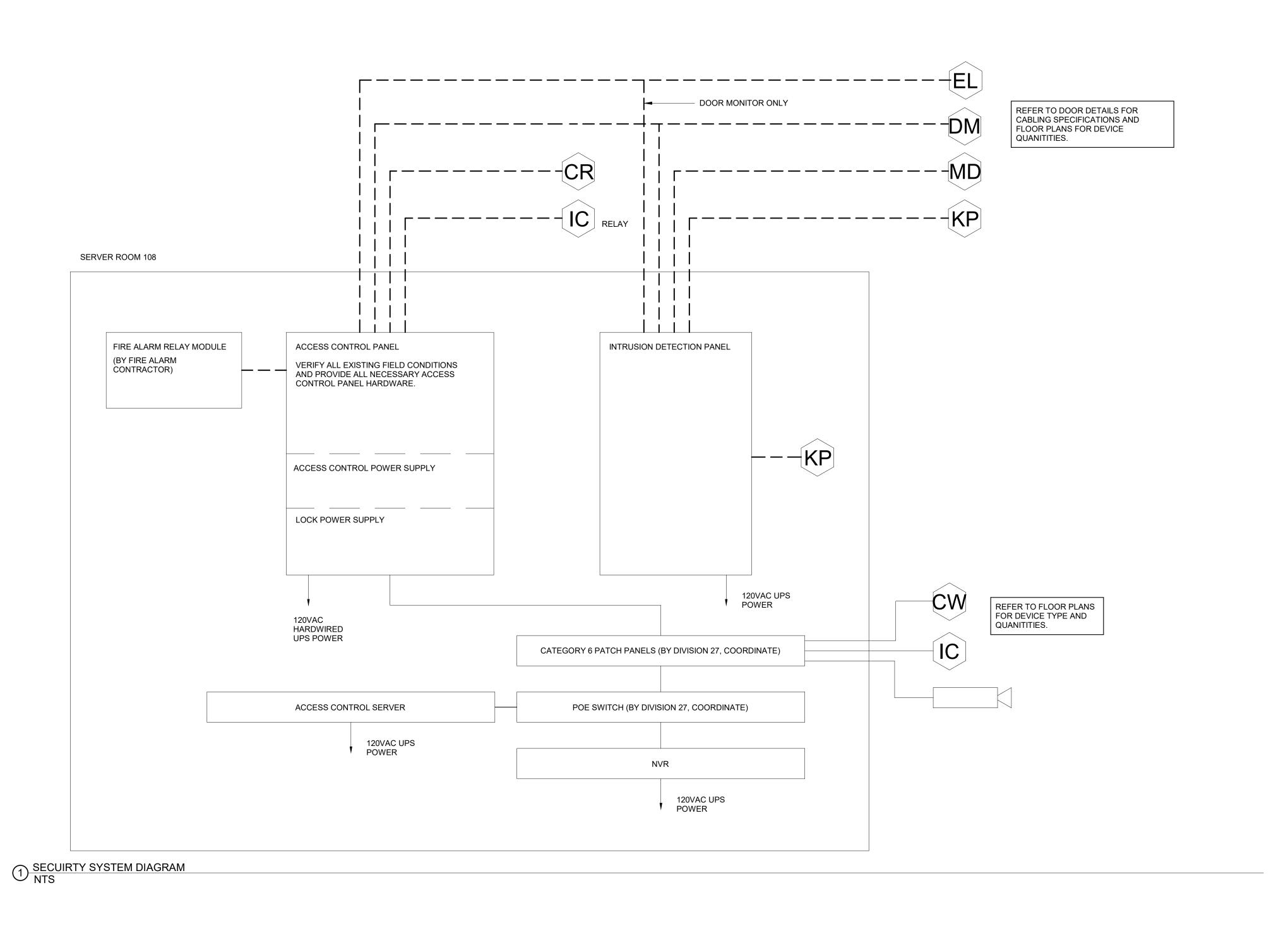
SECURITY **DETAILS**

SHEET TITLE

SHEET NUMBER TY5.00

SECURITY CAMERA SCHEDULE							
LOCATION	CAMERA NO.	TYPE	DESCRIPTION	MOUNTING INSTALL HEIGHT	SERVING ROOM	DETAIL REF. NO. TY5.00	
LOCATION	CAMERA NO.	1111	DESCRIPTION	HEIOH	SERVING ROOM	140. 113.00	
HUB BUILDING	1	03	PTZ	174"	SERVER ROOM 108	4	
HUB BUILDING	2	04	Video Intercom	60"	SERVER ROOM 108	5	
HUB BUILDING	3	01	Fixed-5MP	108"	SERVER ROOM 108	5	
HUB BUILDING	4	01	Fixed-5MP	108"	SERVER ROOM 108	5	
SITE	101	03	PTZ	180"	SERVER ROOM 108	4	
SITE	102	02	Multi-Sensor 180	144"	SERVER ROOM 108	4	
SITE	103	02	Multi-Sensor 180	144"	SERVER ROOM 108	3	
SITE	104	03	PTZ	180"	SERVER ROOM 108	4	
SITE	104	03	PTZ	180"	SERVER ROOM 108	4	
SITE	105	03	PTZ	180"	SERVER ROOM 108	4	

	SECURITY DEVICE SCH	EDULE - HUB BUILDING	
SYSTEM	DEVICE	LOCATION	SERVING ROOM
ACS	HID Signo Reader 40	DOOR 100.A	SERVER ROOM 108
ACS	HID Signo Reader 40	DOOR 108.A	SERVER ROOM 10
ACS & IDS	Electric Lock, Monitor, and REX	DOOR 107.A	SERVER ROOM 10
ACS & IDS	Electric Lock, Monitor, and REX	DOOR 107.A	SERVER ROOM 10
ACS & IDS	Door Monitor	DOOR 103.A	SERVER ROOM 10
ACS & IDS	Door Monitor	DOOR 102.A	SERVER ROOM 10
ACS & IDS	Electric Lock, Monitor, and REX	DOOR 108.A	SERVER ROOM 10
ACS & IDS	Electric Lock, Monitor, and REX	DOOR 100.A	SERVER ROOM 10
IDS	Motion Detector - 90 Deg	OPEN OFFICE 100	SERVER ROOM 10
IDS	Keypad - IDS	OPEN OFFICE 100	SERVER ROOM 10
IDS	Motion Detector - 90 Deg	OPEN OFFICE 100	SERVER ROOM 10
ACS	Video Intercom - 2-Gang	DOOR 100.A	SERVER ROOM 10
ACS	Enclosure - 24"x36"x8"	SERVER ROOM 108	SERVER ROOM 10
IDS	Enclosure - 12"x16"x4.5"	SERVER ROOM 108	SERVER ROOM 10
IDS	Keypad - IDS	SERVER ROOM 108	SERVER ROOM 10
	HID Signo Reader 40	DOOR 107.A	SERVER ROOM 10



PARAGON STAR

LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY

Project No.: 19050.02

Date: 08/06/2021

Issued For: PERMIT SET

REVISIONS

No. Date Description

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

REGISTRATION

CIVIL GBA

LANDSCAPE HOERR SCHAUDT /

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTURAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

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1850004412

EXPIRES 12/31/2021

SHEET TITLE

SECURITY SCHEDULES

TY5.01

SECTION 28: ELECTRONIC SECURITY SYSTEMS

GENERAL REQUIREMENTS

A. WORK INCLUDED

Furnish and install complete electronic security systems for this construction project, consisting of the following: access control system, video surveillance system and video intercom system.

Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation. Ensure that they are in compliance with the requirements state or reasonably inferred by the contract documents.

Work is to be completed by certified installers of the system manufacturer that is being installed.

Work not included / related sections: Common work, such as raceways and backboxes, are by Division 26. Copper and fiber optic cabling for security cameras is by Division 27.

POE network switches and configuration are by Owner. Within 2 weeks after award of project, schedule a meeting or conference call with the owner's IT department to coordinate port counts, bandwidth, and other miscellaneous network requirements (such as IP addresses, MAC addresses, and firewall and VLAN settings).

Codes, standards and guidelines:

Follow the most current revisions of the following codes and standards:

- NFPA 70 national electric code NFPA 101 – life safety code
- NFPA 730 guide for premises security NFPA 731 – installation of electronic premises security systems

ANSI/BICSI 005-2013 – electronic safety and security system design and implementation best practices

BICSI electronic safety and security design reference manual definitions:

ESN – Electronic security network ESC - Electronic security contractor, the primary contractor of this section, responsible for fully coordinating all electronic security system requirements with other divisions and sections, such as power, fire alarm, and pathways/other common work.

KVM – keyboard, video, and mouse NJATC – National Joint Apprenticeship and Training Committee

NVR – network video recorder POE – power over Ethernet

RAID - redundant arrays of independent disks RCCD – registered communications distribution designer, a BICSI designation

RTPM – registered telecommunications project manager, a BICSI designation B. CONTRACTOR QUALIFICATIONS

Bidding contractor shall have a minimum of five continuous years in the business of integrating and installing electronic security systems. Bidding contractor shall be a certified installer by the equipment manufacturers whose products shall be incorporated into this project. Post-award certified installer by the equipment manufacturers whose products shall be a certified installer by the equipment manufacturers whose products shall be a certified installer by the equipment manufacturers whose products shall be a certified installer by the equipment manufacturers whose products shall be a certified installer by the equipment manufacturers whose products shall be incorporated into this project.

C. SUBMITTALS

Pre-bid: Submit product substitution requests prior to bid questions deadline.

Bid: Submit pricing as described in bid form and contractor qualifications.

Pre-construction: Re-submit contractor qualifications, update if necessary. Include resume and contact information for project manager. Product cutsheets. Scaled shop drawings, per the following sub-section. Battery backup / ups calculations.

Project completion: Resubmit approved pre-construction submittals and shop drawings, updated with all changes during construction. Cable databases and test results. Operation and maintenance manuals for all pieces of equipment.

Shop drawings: Scaled floor plans indicating device locations and proposed cable / conduit routing. All devices shown and labeled with a unique identifier. Cable between headend equipment and devices shall be identified by cable type and manufacturer/part number.

2. MATERIALS AND INSTALLATION

A. PRODUCTS

Access control system (ACS): Provide a new access control system to provide a complete functioning system, consisting of the control and monitoring of electro-mechanical barriers that limits physical access to authorized persons to openings of a secured area

Access Control system shall integrate with the following Electronic Security Systems: a. Intercom System – Intercom stations shall be programmed to allow a (soft) button to release/unlock the door or gate adjacent to initiating intercom station.

- Video Surveillance System (VSS) –
- Workstation(s) shall be programmed to display live video and recorded from Video Surveillance cameras. Provide the alarm-handling window with a command button that will display the camera associated with the alarm point.
- Display mouse-selectable icons representing each camera source, to select source to be displayed.

System shall consist of a PC-based Server, networked PC-based client workstation(s), and field-installed panels and devices, connected by an Owner-provided high-speed electronic data transmission network.

Security management software - LenelS2, Open Options, or AMAG. System license shall be for the entire access control system and shall support the number of doors/devices on the plans plus 25% spare. The software shall be for the entire access control system and shall support the number of doors/devices on the plans plus 25% spare. The software shall be for the entire access control system and shall support the number of doors/devices on the plans plus 25% spare.

Access control system server – Provide a rack-mount server; manufacturer shall be the same as the access control system software, or off-the-shelf servers from DELL, HP, or Aberdeen that meet the minimum performance requirements of the ACS software. Submit proposed products in pre-construction submittal. Connect server to rack-mount UPS capable of providing (30) minutes of back-up power.

Access control client workstation – provide desktop PC with keyboard, mouse, and (2) 24" LCD monitor with minimum Quad HD (2560 x 1440) resolution. Manufacturer shall be the same as the video management software, or off-the-shelf computers from DELL, HP, or Aberdeen that meet the minimum performance requirements of the ACS and VSS client software. Connect workstation to desktop UPS capable of providing (30)

Door Hardware Interface – Coordinate with Division 08 Sections that specify door and gate hardware and hardware in this Section. The Controllers in this Section shall have electrical characteristics that match the signal and power requirements of door hardware in this Section.

Card readers – Readers shall operate at the 13.56 MHz frequency, and shall also be near-field communications (NFC) and Bluetooth compliant to enable the use of mobile phones as access credentials. a. Refer to schedule on contract drawings for approved manufacturer and model numbers.

Credentials – Credential cards shall be thin, flexible polyvinyl chloride (PVC) laminate that operate at the 13.56 MHz frequency. Provide (100) spare cards, delivered to Owner at time of Owner Training.

Cabling – utilize shielded, multi-pair conductors of sufficient wire gauge and pair count as recommended by the device manufacturers. Submit proposed cable cutsheets and indicate cable type on riser diagram shop drawing. Manufacturer shall be: Belden, Draka, General Cable, Tappan, West Penn Wire, or approved equivalent.

Intrusion Detection System: Provide a new intrusion detection system to provide a complete functioning system that is hard-wired, modular, and microprocessor-based, with intrusion detection system to provide a complete functioning system. Program the system to perform in the following manner: alarms shall trigger an alarm. While the system is armed, motion detectors and door monitors in multiple zones shall trigger an alarm. While the system is armed, motion detectors and door monitors in multiple zones shall trigger an alarm. While the system is armed, motion detectors and door monitors in multiple zones shall trigger an alarm. While the system is armed, motion detectors and door monitors in multiple zones shall trigger an alarm. doors. The system shall have multiple codes to disarm certain zones; coordinate exact codes, zones and function of codes with owner prior to installation. The system components shall be continuously monitored for normal, alarm, supervisory, and trouble conditions.

Intrusion detection control panel - manufacturer shall be Bosch 5512 Series.

Control panel capacity – provide quantity of control panels with sufficient capacity to accommodate 25% increase in load, devices, and zones. Control panel accessories – provide integral battery backup to power the system in the event of a power outage - a minimum of 6 hours in standby mode and 5 minutes in alarm mode; include power draw and battery calculations with pre-construction shop drawing submittal.

Keypad – provide keypad compatible with the intrusion detection panel. It shall have a minimum of a 2 line by 16 character backlit LCD, piezo-electrical sounder, and 16 keys on the key pad. Refer to plans for locations and quantity. Submit product cutsheet from same manufacturer of control panel.

Motion detector – shall be dual technology sensors that detect changes in microwave signals and a PIR sensor that detects changes in ambient level of infrared emissions caused by standard-intruder movement within detection pattern. It shall be listed and labeled by a qualified testing agency for compliance with SIA PIR-01. Manufacturer shall be Bosch.

Door position switch – shall be steel and DPDT. All door position switches shall be recessed, with 1" diameter, minimum ½" gap, and the color shall closely match the door frame. Manufacturer shall be Interlogix.

Cabling – utilize shielded, multi-pair conductors of sufficient wire gauge and pair count as recommended by the device manufacturers. Unshielded cable for intrusion detection communication bus wiring is acceptable. Submit proposed cable type on riser diagram shop drawing. Manufacturers shall be: Belden, Draka, General Cable, Tappan, West Penn Wire, or approved equivalent.

Video surveillance system (VSS): Provide a complete and functioning video surveillance system, consisting of a minimum of 30 days, unless otherwise noted on the contract drawings, with multiple hard drives in a Raid 5 configuration.

Video management software (VMS) – Manufacturers shall be: Genetec, Avigilon, Salient or Milestone.

Security cameras – Refer to schedule on contract drawings for approved manufacturer and model numbers. Alternative manufactures will be considered prior to bid only.

Network video recording servers (NVR) – provide rack-mount server(s) to record all cameras per specifications described in this section. Manufacturer shall be the same as the video management software, or off-the-shelf computers, servers, and storage components from DELL, HP, or Aberdeen that meet the minimum performance requirements of the VMS software. Submit proposed products in pre-construction submittal. Connect server to rack-mount UPS capable of providing (30) minutes of back-up power.

Video management software server – provide rack-mount server(s) to manage all cameras per specifications described in this section. The VMS may reside on the recording server if the server meets the VMS manufacturer's performance requirements for both. The server shall be the same as the video management software, or off-the-shelf computers, servers, and storage components from DELL, HP, or Aberdeen that meet the minimum performance requirements of the VMS software. submit proposed products in pre-construction submittal. Connect server to rack-mount UPS capable of providing (30) minutes of back-up power.

Cabling: Copper and fiber optic cabling for security cameras provided by Division 27. Coordinate patch cables with Division 27.

4. EXECUTION

A. GENERAL REQUIREMENTS

Label devices, control panel(s), and associated cabling with identification number/room number as indicated on the drawings. Where drawings are silent, coordinate labeling scheme with owner prior to pre-construction submittals and indicate proposed identification/labeling on pre-construction shop drawings.

Wiring method (wall mounted devices): install wiring in conduit from wall-mounted devices to accessible ceiling space concealed in wall; continue wiring to control panel above accessible ceiling areas and concealed conduit for all inaccessible (hard) ceiling areas.

Wiring method (ceiling devices): install wiring to control panel above accessible ceiling areas supported via j-hooks every 60" or less; provide overhead conduit (installed tight to structure) for all exposed ceiling areas and concealed conduit for all inaccessible (hard) ceiling areas.

Wiring within enclosures: bundle, lace, and train conductors to terminal points. use lacing bars and distribution spools. Separate power-limited and non-power-limited and non-p blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

All cabling shall be labeled with a machine-printed label within 6 inches of each end. All cable labels shall be thermal-transfer type and utilize self-adhesive labels.

Cable terminations: cable connections to device and security panel shall be soldered or heat-shrunk from jacket to jacket. Exposed conductors, even within an enclosure or backbox, are not allowed.

Key all control panel enclosures the same and furnish three keys to owner at end of Owner training session.

Grounding: ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments. Ground equipment in accordance with manufacturer and IEEE 1100.

B. ACCESS CONTROL AND INTRUSION DETECTION SYSTEM Cabling by ESC. Division 27 contractor to provide network to access control panel.

ACS software – develop, install, and test software and databases for the complete and proper operation of systems involved. Assign software license to owner. The ESC is responsible for the setup of the systems involved. Assign software license to owner. The ESC is responsible for the setup of the software, including preparing and installing graphic maps.

Coordination – Door electronic locking hardware by Division 8 contractor. ESC shall provide power supplies, cabling and terminations for the electronic locking hardware. Testing – verify access control doors and detectors are working and auxiliary input and output devices are functioning properly. Verify access control doors and input and output devices are correctly identified within the system software.

Video Security System: Camera category cabling (including patch cables) and fiber optic cabling by Division 27. Final terminations by ESC. Coordinate labeling system contractor. Ensure exterior cameras are protected with in-line surge protection.

POE network switches are by owner – coordinate network requirements with owner's IT staff. Obtain patch cables from structured cabling system contractor and install as directed by owner.

VMS software – develop, install, and test software and databases for the complete and proper operation of systems involved. Assign software license to owner. The contractor is responsible for the entire programming and setup of the system such that no additional programming is required. Programming shall include the setup of the system such that no additional programming and installing graphic maps.

Coordinate field-of-view and lens/zoom for each camera with owner prior to installation. Program camera titles and on-screen placement as coordinated with owner.

Cleaning - clean video surveillance system components, including camera-housing windows, lenses, and monitor screens.

Testing – verify cameras are working and capturing intended field-of-view in focus. Verify cameras are correctly identified on the graphical map.

D. OWNER TRAINING

Demonstration - within two weeks of substantial completion, provide one 4-hour training session with owner to demonstrate the following:

Access Control/Intrusion Detection System: Arming/Disarming system, process to change keypad codes, add and remove access control credentials and personnel to the system, and assigning access control doors to personnel groups.

Video Surveillance System: Create live camera views, create, and archive recorded video clips, and playback recorded video.

Train owner's maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining equipment.

Demonstrate methods of determining optimum alignment and adjustment of components and settings for system controls.

Adjusting: include in bid one additional site visit (outside of normal occupancy hours) within the first 12 months after substantial completion to adjust the system to suit actual occupied conditions.

END OF SECTION 28



LOT 20 - HUB

3151 NW PARAGON PKWY

Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET REVISIONS

REGISTRATION

PROJECT TEAM

FINKLE+WILLIAMS

BSE STRUCTURAL **ENGINEERS**

HENDERSON

ENGINEERS

ARCHITECTURE CIVIL

LANDSCAPE HOERR SCHAUDT BSE STRUCTURAL FOUNDATIONS **ENGINEERS**

STRUCTURAL PLUMBING

ARCHITECT

MECHANICAL HENDERSON ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON

HENDERSON ENGINEERS

CONTRACTOR FOGEL ANDERSON

LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412 EXPIRES 12/31/2021

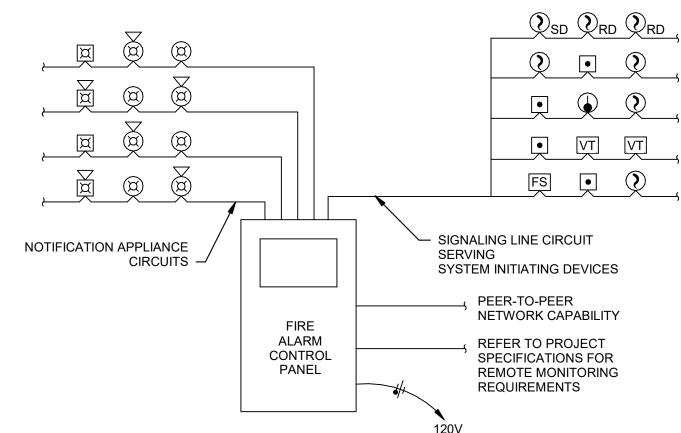
SHEET TITLE

FIRE PROTECTION GENERAL NOTES:

- 1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 2. SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL BE IN ACCORDANCE WITH APPLICABLE NFPA STANDARDS. SYSTEM SHALL ALSO MEET ALL APPLICABLE BUILDING CODES, FIRE CODES AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER. VERIFY REQUIREMENTS PRIOR TO BID SUBMITTAL.
- 3. INFORMATION ON CONTRACT DOCUMENTS IS GENERAL INFORMATION AND FOR BID PURPOSES ONLY. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE FINAL SYSTEM DESIGN AND LAYOUT OF ALL COMPONENTS, COORDINATION WITH ALL OTHER TRADES, AND SYSTEM CALCULATIONS REQUIRED FOR APPROVAL BY THE AUTHORITY HAVING JURISDICTION, ENGINEER, AND OWNER'S INSURER.
- 4. THE CONTRACTOR SHALL FOLLOW THE ENGINEER OF RECORD'S SYSTEM DESIGN AND LAYOUT OF ALL COMPONENTS EXCEPT WHERE MODIFICATION TO THE DESIGN IS NECESSARY. MODIFICATIONS SHALL BE REFLECTED IN THE CONTRACTOR'S SHOP DRAWINGS AND CALCULATIONS.
- 5. DEVIATIONS FROM ENGINEER'S DESIGN WILL NOT BE CONSIDERED UNLESS A FORMALLY SUBMITTED RFI IS RECEIVED AND APPROVED.
- 6. THE CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND LABOR REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM AS INDICATED IN THE DRAWINGS AND SPECIFICATIONS.
- 7. PROVIDE ADDITIONAL MATERIALS AND LABOR REQUIRED DUE TO LACK OF COORDINATION OR TO MEET AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER REQUIREMENTS AT NO ADDITIONAL COST TO THE OWNER.
- 8. FORWARD COMPLETED CERTIFICATE OF COMPLETION AND CONTRACTOR MATERIAL TEST CERTIFICATES TO THE OWNER.
- 9. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

THIS IS A MA	STER LEGEND A	ND NOT ALL SYMBOLS OR ABB	<u>REVIATIONS</u>	ARE USED.	V2.02
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LOCAL REQUIREMENTS.



DEMOLISH— — — —

FUTURE

RISER DIAGRAM IS SCHEMATIC IN NATURE. NOT ALL DEVICES ARE SHOWN. REFER TO PLANS FOR EQUIPMENT QUANTITIES AND LOCATIONS. DUCT DETECTORS MAY HAVE INTEGRAL RELAYS FOR AIR HANDLING UNIT SHUT-DOWN AND FIRE/SMOKE DAMPER CONTROL. WIRING FOR THIS FUNCTION HAS NOT BEEN SHOWN. COORDINATE WITH MECHANICAL SYSTEM INSTALLER.

REFER TO PLANS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

3 FIRE ALARM RISER DIAGRAM - ADDRESSABLE SYSTEM (NON-VOICE)
NTS



LOT 20 - HUB

3151 NW PARAGON PKWY

Project No.: 19050.02 Issued For: PERMIT SET REVISIONS ____ ____

CHRISTOPHER J. CULP

REGISTRATION

LICENSE # PE-2013037646 PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL GBA HOERR SCHAUDT / LANDSCAPE FOUNDATIONS BSE STRUCTURAL **ENGINEERS** STRUCTURAL BSE STRUCTURAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON **ENGINEERS** HENDERSON ELECTRICAL **ENGINEERS**

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

> 1850004412 EXPIRES 12/31/2021

FIRE PROTECTION HENDERSON

CONTRACTOR FOGEL ANDERSON

ENGINEERS



SHEET TITLE FIRE ALARM GENERAL NOTES AND LEGEND

FIRE ALARM PLAN NOTES:

PANELS AT THE DEVELOPMENT.

- 1 PROVIDE NEW FIRE ALARM CONTROL PANEL. THE PANEL SHALL BE CAPABLE OF CONNECTING TO A PEER-TO-PEER NETWORK FOR COMMUNICATION WITH OTHER FIRE ALARM
- 2 PROVIDE DUCT MOUNTED SMOKE DETECTOR FOR FAN POWERED MECHANICAL AIR HANDLING EQUIPMENT SHUTDOWN. INSTALL DETECTOR PER MANUFACTURER'S RECOMMENDATIONS. REFER TO MECHANICAL SHEETS FOR
- EQUIPMENT AND DUCTWORK LAYOUT AND DETAILS. 3 PROVIDE LOW VOLTAGE WIRING FROM DUCT DETECTOR TO REMOTE TEST STATION. MOUNT REMOTE TEST STATION IN
- CEILING. 4 PROVIDE EQUIPMENT AND CONNECTIONS REQUIRED TO UNLOCK ACCESS CONTROL LOCKS UPON SIGNAL FROM FIRE ALARM CONTROL PANEL.
- 5 PROVIDE FIRE DEPARTMENT KEY BOX FOR FIRE DEPARTMENT ACCESS. PROVIDE EQUIPMENT AND CONNECTIONS NECESSARY TO MONITOR KEY BOX INTERNAL SUPERVISORY SWITCH(ES), AS REQUIRED.



LOT 20 - HUB BUILDING

3151 NW PARAGON PKWY

Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET REVISIONS ____ ____

REGISTRATION

CHRISTOPHER J. CULP LICENSE # PE-2013037646

PROJECT TEAM ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE HOERR SCHAUDT /

FOUNDATIONS BSE STRUCTURAL

HENDERSON

ENGINEERS STRUCTURAL BSE STRUCTURAL **ENGINEERS**

PLUMBING HENDERSON **ENGINEERS**

MECHANICAL

ENGINEERS ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON **ENGINEERS**

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> 1850004412 EXPIRES 12/31/2021

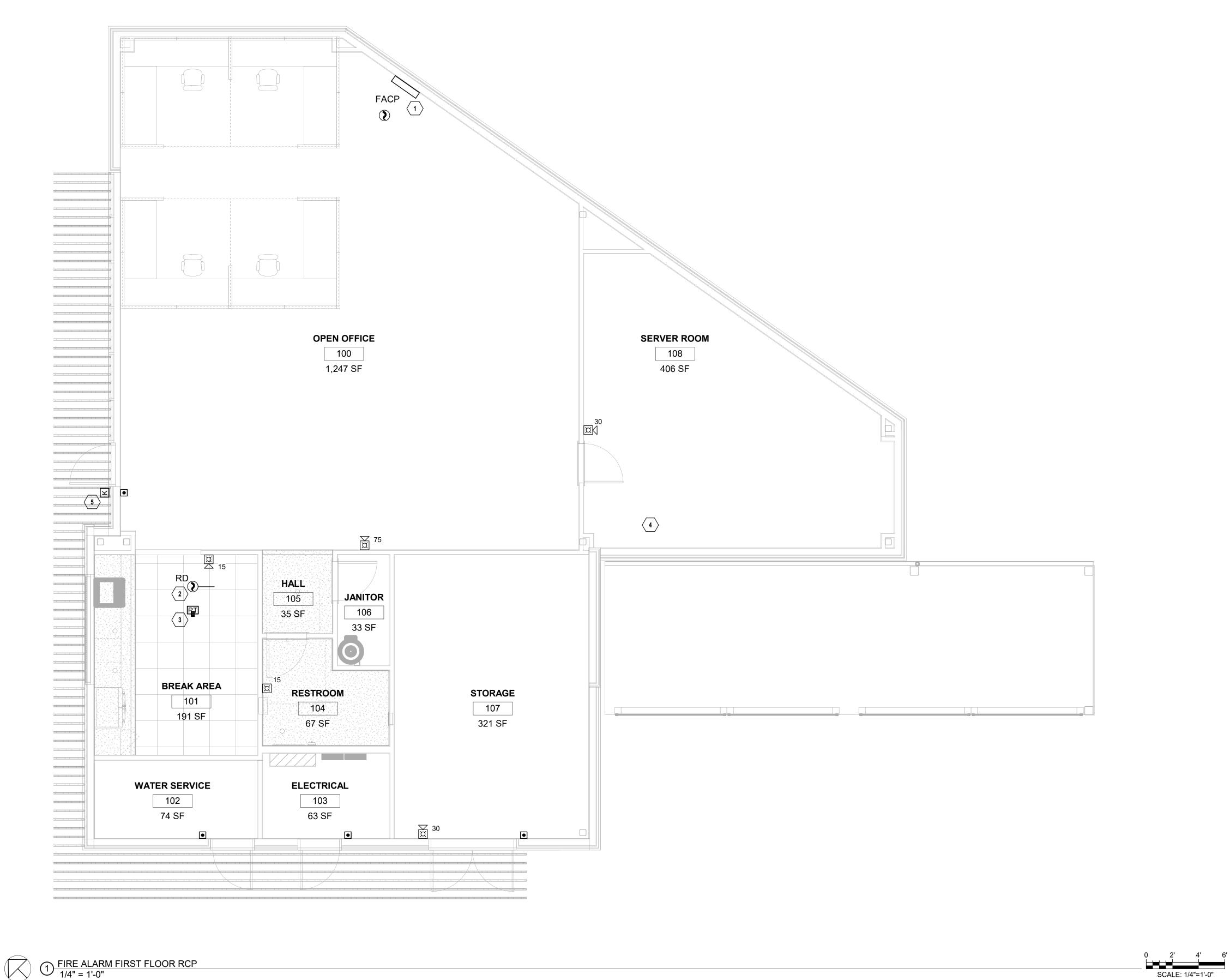


SHEET TITLE

FIRE ALARM FIRST FLOOR RCP

SHEET NUMBER

FA1.01



Division 28: FIRE ALARM SYSTEM

GENERAL INSTRUCTIONS

A. GENERAL REQUIREMENTS

B. DEFINITIONS

All requirements under Division 01 (General Requirements) and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01 (General Requirements), this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each system as implied by the design and the equipment specified.

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

Installation of devices shall be performed or supervised by a National Institute for Certification of Engineering Technologies (NICET) Level 2 or higher fire alarm technician. Submit copies of the certification for employees through shop drawing submittals.

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition

1995 Edition Division 21 – Fire Suppression Division 15 Division 22 – Plumbing Division 15

Division 23 – HVAC Division 26 – Electrical Division 16 Division 27 – Communications Division 16 Division 28 – Electronic Safety and Security Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

Division 15

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Provide: "to furnish and install, complete and ready for the intended use."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this

division, complete and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work.

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

warranty required by this division."

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

D. SCOPE OF WORK

The scope of work in this section includes fire alarm control panels, manual fire alarm pull station, automatic smoke detector, fire alarm notification appliances, air handling unit shutdown, and battery stand-by power.

E. CODES AND STANDARDS

Provide an integrated fire alarm system, which meets the current versions of NFPA 70, National Electrical Code; NFPA 72, National Fire Alarm Code; and all local building and fire codes. All fire alarm equipment shall be Underwriters Laboratory (UL) approved for the type and class of service performed.

The fire alarm system shall be a non-coded manual and automatic fire alarm system with connections to a remote supervising station. Control panel shall be micro-processor based, with

fully addressable alarm devices. The control panel shall be capable of connecting to a peer-to-peer network. G. COORDINATION

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access

to those items requiring maintenance. Components installed without regard to the above shall be relocated at no additional cost to the Owner. H. SUBMITTALS

Upon being awarded a contract, submit to the Architect for approval, six (6) copies of manufacturer's shop drawings for equipment to be furnished under this contract, items requiring coordination between contractors, and sheet metal ductwork fabrication drawings. Before submitting shop drawings and material lists, verify that equipment submitted is mutually compatible and suitable for the intended use, and will fit the available space and allow ample room for maintenance. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being proposed. Submit shop drawings as early as required to support the project schedule. Allow for two weeks Engineer review time plus mailing time plus a duplication of this time for resubmittal if required.

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used.

The checking and subsequent approval of such shop drawings by the Engineer shall not relieve the Contractor from responsibility for errors in dimensions, details, size of members, quantities, omissions of components or fittings; coordination of electrical requirements; or for coordinating items with actual building conditions. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

Submit a detailed sequence of operation. Pre-printed, generic material will not be accepted and will be rejected. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being proposed.

Submit [shop drawings showing fire alarm floor plans and a full tenant riser diagram][shop drawings showing fire alarm floor plans and a full building riser diagram]. Fire alarm floor plans and riser diagram shall show fire alarm control panel, annunciator, all fire alarm initiating devices and notification appliances. Show typical wiring diagrams of control panel/s, annunciator and each device and wiring connections required. Show all interfaces to other systems, such as temperature control systems, and security systems.

Where required by the AHJ, Contractor is responsible for obtaining a professional engineer or NICET stamp and signature on their shop drawing submittal. The Engineer is not responsible and will not provide this.

Shop drawings shall be produced using Computer Aided Design. Hand drawn documents will not be reviewed or approved.

Shop drawing scale shall match the Engineer's drawings where possible. Scale shall not be less than 3/32" = 1'-0".

Submit a bill of material and manufacturers product data for all devices and equipment.

Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the shop drawings have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal and shall clearly indicate the materials, performance criteria and accessories being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

I. ELECTRONIC DRAWINGS

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive, or direct download, as desired, from the Engineer for a fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, written authorization from the Architect and release agreement from the Engineer must be received before electronic drawing files will be sent.

J. RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

See Division 01 and General Conditions for additional information.

K. QUALIFICATIONS

The manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum three years documented experience. The installer shall be a company specializing in installing the products specified in this section with minimum three years documented experience, be a bonded and licensed contractor and merchant of electronic automated fire alarm systems, and employ full-time factory-trained installers and technicians. The equipment manufacturer's service department shall be fully stocked in standard parts and components and engaged in the maintenance of fire alarm systems. On-the-premises service shall be available within 4 hours of notification, 7 days a week, 24 hours a day. Furnish service and maintenance of fire alarm system for one year from date of substantial completion.

L. WARRANTIES

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

All corrective software modifications made during warranty periods shall be updated on all user documentation and on user and manufacturer archived software disks.

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

Perform the remedial work promptly, upon written notice from the Engineer or Owner.

At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

MATERIALS AND INSTALLATION

MANUFACTURERS

Subject to compliance with requirements, provide products manufactured by the following manufacturers: Notifier or Engineer approved equal.

B. FIRE ALARM CONTROL PANEL

The fire alarm system shall be a microprocessor-based system designed specifically for fire applications. The system shall be UL listed under Standard 864 (Control Units for Fire-Protective Signaling Systems). Modular construction with a flush mounted enclosure. Peer-to-peer network capability shall be provided.

Power Supply: Provide two separate and reliable power supplies. The control panel shall receive 120 Vac power via a dedicated branch circuit of the building's electrical system. Each shall have adequate capacity for the system. The fire alarm contractor shall submit battery calculations for review and approval. The calculations shall indicate each device and the load required in stand-by and alarm mode. The secondary power system shall be a battery-operated emergency power supply and charger with capacity for operating system in standby mode for 24 hours followed by alarm mode for 5 minutes.

System Supervision: Automatically detects and reports open circuits, shorts, and grounds of wiring for initiating device, signaling line, and notification appliance circuits. Alarm, supervisory and trouble signals shall be monitored by the supervising station over a Digital Alarm Communicator Transmitter (DACT), or other approved method.

Initiating Device Circuits: Provide circuitry, which meets the performance requirements during abnormal conditions, based upon the style and class of the circuitry selected. Initiating device circuits shall be Class B.

Notification Appliance Circuits: Provide circuitry, which meets the performance requirements during abnormal conditions, based upon the style and class of the circuitry selected. Notification appliance circuits shall be Class B.

Signaling Line Circuits: Provide circuitry, which meets the performance requirements during abnormal conditions, based upon the style and class of the circuitry selected. Signaling line

Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts to provide accessory functions specified.

Digital Alarm Communicator Transmitter (DACT): Electrically supervised, capable of transmitting alarm, supervisory and trouble signals over telephone lines to remote station receiver. The installing contractor shall select the appropriate DACT equipment based on the available communication methods. Coordinate with General Contractor to ensure proper connections are provided for communication to and from the DACT. Two (2) separate communication methods are required and shall not be subject to a common failure within the scope of work identified within these contract documents. Unless noted otherwise, the installing contractor shall utilize two (2) of the following communication methods:

Copper wire (POTS) telephone line for fire alarm use as required by NFPA 72. Exception: If two (2) POTS telephone lines are utilized per NFPA 72, additional communication methods are not required.

Building 10/100 Base network (LAN), DSL modem, or cable modem. GSM cellular networks in the area including 2G, 3G and 4G. The transmitter shall automatically detect and choose the best network in the area based on signal strength and

immediately self-adjust for operation as necessary. Other alternative method complying with the performance requirements of NFPA 72 for 'Communication Methods for Supervising Station Alarm Systems that is acceptable to the Authority Having Jurisdiction and the Engineer of Record. Approval of any alternative methods must be obtained from the Engineer of Record via an RFI prior to submitting bids for the scope of work.

Provide trouble acknowledge, drill, and alarm silence switch.

The control panel shall have dedicated alarm, supervisory and trouble LED's and dedicated alarm, supervisory and trouble acknowledge switches

Lamp Test: Manual lamp test function causes each LED to function at fire alarm control panel.

Drill Sequence of Operation: Manual drill function causes alarm mode operation as described above.

Addressable systems shall have silent walk test, history logging for a minimum of 400 events, 80 character LCD display.

C. SEQUENCE OF OPERATIONS

Trouble Sequence of Operation: System or circuit trouble places system in trouble mode, which causes the following system operations:

Visible and audible trouble alarm indicated at fire alarm control panel.

Trouble signal transmitted to supervising station. Manual acknowledge function at fire alarm control panel silences audible trouble alarm; visible alarm is displayed until initiating failure or circuit trouble is cleared. Supervisory Sequence of Operation: The activation of any sprinkler valve tamper switch or duct-mounted smoke detector places system in supervisory mode, which causes the

Visible and audible supervisory alarm indicated by address at fire alarm control panel and remote annunciator panel (if provided).

Supervisory signal transmitted to supervising station.

Duct-mounted smoke detectors shall shutdown their respective unit upon detection of smoke and remain down until manually reset.

Fan-powered terminal units that are less than 2,000 cfm and are not provided with duct detection shall shutdown when its respective air handling unit is shutdown. Manual acknowledge function at fire alarm control panel and remote annunciator panel silences audible supervisory alarm; visible alarm is displayed until device is returned to its normal position/supervisory condition is cleared.

Alarm Sequence of Operation: Actuation of an alarm initiating device places system in alarm mode, which causes the following system operations.

Audible notification appliances shall sound until silenced by the alarm silence switch at the control panel.

All visible alarm notification appliances shall display a continuous synchronized pattern until reset by the Alarm Reset Switch.

Alarm signal transmitted to supervising station. All fan-powered air-handling equipment shall shutdown and remain down until the fire alarm control panel is reset. The alarm LED shall flash on the control panel until the alarm has been acknowledged at the control panel. Once acknowledged, this same LED shall latch on and the custom

label for the address in alarm shall be displayed on the alphanumeric LCD readout. A subsequent alarm received from another address after acknowledged shall flash the alarm LED on the control panel showing the new alarm information A pulsing alarm tone shall occur within the control panel until acknowledged.

INITIATING DEVICES

Manual Pull Station: Provide semi-flush, non-coded type, double action manual pull station.

Smoke Detector (Photoelectric type): Device shall have visible indication of detector actuation, self-restoring, plug-in with an integral addressable module indicating the detector status. Photoelectric detectors shall have sensitivity between 0.5 and 3.5 percent/foot smoke obscuration.

Duct Mounted Smoke Detector: Photoelectric detector along with a standard, relay or isolator detector mounting base. Provide for variations in duct air velocity between 100 and 4000 feet per minute. Protect the measuring chamber from damage and insects. Provide an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Provide drilling templates and gaskets to facilitate locating and mounting the housing. Provide remote alarm LEDs and remote test stations as shown on the plans. Provide duct detection and shutdown for air distribution systems exceeding 2,000 cfm.

E. NOTIFICATION APPLIANCES

Alarm Horn: Surface type fire alarm horn. Sound rating: 90 dB at 10 feet.

Visible Alarm Notification Appliances (Strobes): Strobes shall be xenon or equivalent, unfiltered or clear filtered white light, intensity as indicated on drawings, flash rate range from 1 to 3 Hz, a maximum pulse duration of 0.2 sec with a maximum duty cycle of 40 percent. Strobe shall meet all requirements of the Americans with Disabilities Act.

Audible/Visible Alarm Notification Appliances (Horn/Strobes): Combination units shall provide a common enclosure for the fire alarm audible and visible alarm appliances and be UL listed for its purpose. Minimum audible level and strobe intensity shall meet all requirements for separate appliances.

Provide flush or recessed devices unless otherwise noted.

F. AUXILIARY DEVICES

Monitor Module: Addressable microelectronic module providing a system address for alarm initiating devices for wired applications with normally open contacts. Include address setting

Control Relay Module: Provide intelligent control relay modules. The control relay module shall provide one form "C" dry relay contact rated at 2 amps at 24 Vdc to control external appliances or equipment shutdown. The control relay shall be rated for pilot duty and releasing systems. The position of the relay contact shall be confirmed by the system firmware.

Fire Department Key Box: By Knox Company. Provide with an internal switch to indicate a supervisory condition at the fire alarm control panel when the lid is removed. G. FIRE ALARM WIRE AND CABLE

Fire Alarm Power Branch Circuits: Building wire as specified in Division 26.

Signaling Line, Initiating Device, and Notification Appliance Circuits: Power limited fire-protective signaling cable, solid copper conductor, 300 Volts insulation, suitable for temperature, conditions and location installed. Minimum wire size for initiating device circuits, control circuits and notification appliance circuits shall be determined by calculations and manufacturer's requirements or recommendations. Wire and cable shall be twisted and shielded if recommended by the system manufacturer. Initiating, notification, and control circuits shall be sized based on 20 percent additional power consuming devices. The conductors shall meet the requirements of NEC Article 760.

All wiring provided on this project shall be UL listed for the intended use. All wiring including wiring to existing modified devices and appliances shall be new.

EXECUTION

A. GENERAL

Install, program, and test all new equipment identified in this contract and revise existing equipment as noted.

The installation supervisor shall be on the job site during the entire installation. The installation supervisor shall maintain marked up copies of the drawings at the job site showing as-built conditions. These drawings shall be updated daily and available for Owner review.

Provide all required conduit and all associated hardware and install (pull), connect, and test all cable for a complete fire alarm system. Install all wiring in accordance with the guidelines of these specifications and documents as well as the NFPA codes and standards listed in these specifications.

B. INSTALLATION

Install all wiring in conduit. Minimum allowable conduit size shall be 3/4 inch. Size the conduit so that conduit fill does not exceed 75 percent of NFPA 70 maximum fill requirements. Cables in vertical risers shall not exceed 50 percent of NFPA 70 maximum fill requirements. Conduit installation shall be as required by the Contractor's layout and as described in these specifications. All conduit field routing shall be acceptable to the Owner. Routing not acceptable shall be rerouted and replaced without expense to the Owner.

Conceal all wire, cable, conduit, and raceways in walls, ceiling spaces, electrical shafts, or closets in finished areas except as specifically noted otherwise. Conduit and raceways may be exposed in unfinished areas or where specifically approved by the Owner.

Except as otherwise specified or indicated on the drawings, Install all conduit parallel or perpendicular to dominant surfaces with right angle turns made of symmetrical bends or fittings. Except where prevented by the location of other work, a single conduit or a conduit group shall be centered on structural members.

Label all conduits and junction boxes as specified in Division 26. Terminate all wiring at devices or panels using terminal connectors for screw type terminals. All terminal connectors for conductors shall be pre-insulated ring type or pre-insulated spade

Locate conduit at least six inches from hot water or steam pipes and from other hot surfaces. Conduit shall not block access to any existing equipment or fixtures.

type. Pre-insulated terminal connectors shall include a vinyl sleeve, color coded to indicate conductor size. Pre-insulated terminal connectors shall include a metallic support sleeve bonded to the vinyl-insulating sleeve and designed to grip the conductor insulation.

Mount end-of-line device in box with last device or separate box adjacent to last device in circuit for conventional hardwired Class B initiating and notification appliance circuits. Securely fasten conduit to all boxes and cabinets. Threads on metallic conduit shall project through the wall of the box to allow the bushing to butt against the end of the conduit. The

locknuts both inside and outside shall then be tightened sufficiently to bond the conduit securely to the box. Conduit shall enter cabinets from the bottom and sides only.

Install manual stations with operating handle 48 inches above floor unless noted otherwise on drawings.

Install ceiling mounted initiating devices in areas with exposed structure tight to underside of floor/roof deck.

Do not install smoke detectors in a direct air flow nor closer than 3 feet (1 meter) from an air supply diffuser or return air opening.

Install wall mounted visible and audible/visible notification appliances with visible element (strobe) between 80 inches and 96 inches above finished floor unless noted otherwise on

Install wall mounted audible devices with the top of the device at least 90 inches above finished floor or 6 inches below the ceiling, whichever is lower, unless noted otherwise on drawings. If combination devices are installed, they shall be installed per the visible signal device requirements.

Make conduit and wiring connections to equipment provided by others. Provide strobe synchronization as required per NFPA 72.

A. FIELD QUALITY CONTROL

C. ACCEPTANCE TESTING

technicians.

Systems shall be checked and tested in accordance with the instructions provided by the manufacturer to ensure that the system functions as required and is free of grounds, opens, and shorts. Each device shall be tested. Smoke detectors shall be tested with products of combustion.

Upon completion of the system installation and before the date of final acceptance, a factory-trained technician shall perform all necessary tests and adjustments and shall file a Letter of Certification and a Certificate of Completion (NFPA 72) with the Owner indicating that the system functions and conforms to the specifications.

Test in accordance with NFPA 72 and local fire department requirements.

B. MANUFACTURER'S FIELD SERVICES Include services of factory trained and certified technician to supervise installation, adjustments, final connections, and system testing as performed by the Contractor's factory-trained

The equipment supplier's factory trained technician shall train the Owner's personnel in the proper use and maintenance of the system. Training sessions shall be conducted as needed, not to exceed a total of 2 sessions, with each session lasting a maximum of 4 hours each.

Upon completion of the system installation, a factory-trained technician shall perform all necessary tests and adjustments in the presence of the Owner's designated personnel. **END OF SECTION 28**



LOT 20 - HUB

3151 NW PARAGON PKWY

Project No.: 19050.02 08/06/2021 Issued For: PERMIT SET **REVISIONS** ____ ____ ____ ____ ____ ____ ____ ____ REGISTRATION

> CHRISTOPHER J. CULP LICENSE # PE-2013037646

> > PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL LANDSCAPE HOERR SCHAUDT FOUNDATIONS BSE STRUCTURAL **ENGINEERS** STRUCTURAL BSE STRUCTURAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS MECHANICAL** HENDERSON **ENGINEERS**

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EXPIRES 12/31/2021

FIRE PROTECTION HENDERSON

CONTRACTOR FOGEL ANDERSON

HENDERSON

ENGINEERS



SHEET TITLE

FIRE ALARM