ADDENDUM NO.: TWO DATE: September 13, 2017

PROJECT TITLE: **ADMISSIONS & VISITORS CENTER**
UNC CHARLOTTE
SCO ID# 15-12632-02A
WTS Project No. 1604

WRITTEN BY: Jana Hartenstine, AIA, LEED AP BD+C, CDT

TO: Prospective Bidders / Plan Holders

This addendum is issued pursuant to the University of North Carolina General Administration Instructions to Bidders and General Conditions of the Contract in connection with the revision of Bidding Documents which have been previously issued.

Addenda are issued prior to execution of Contract. All instructions contained herein shall be reflected in the Contract Sum and this Addendum will be made a part of the Contract Documents, if, as, and when a Construction Contract is awarded.

This Addendum forms a part of the Contract Documents and modifies the original documents dated August 24, 2017, as noted below. Acknowledge receipt of this Addendum in this space provided on the Form of Proposal. Failure to do so will subject the Bidder to disqualification.

This Addendum consists of **56** pages and the **13** 30X42 SHEET attachments.

It is worth noting that the most significant change in this addendum is the moving of the Fire Pump (previously Add Alternate #11 back into the base bid. The hydrants had 2 previously conflicting flow tests, and a 48 hour flow test was recently completed to verify the requirements now that school is back in session.

A. REVISIONS TO THE PROJECT MANUAL:

1. Revise the project manual by replacing spec sheets/sections/individual pages with the following project manual sheets as follows:

    1. TABLE OF CONTENTS (7 PAGES)

    2. SECTION 01 2300 “ALTERNATES” – Replace page 01 2300-3 with the attached pages to remove Alternate 11 “Fire Pump” and put it back in the base bid. (1 PAGE)

    3. FORM OF PROPOSAL – dated 09.13.2017 (7 PAGES) to remove the Add Alternate 11

4. SECTION 08 4113 “ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS” – Replace page 08 4113-8 (1 PAGE).

5. SECTION 08 7100 DOOR HARDWARE to be revised as follows:

HARDWARE GROUP NO. E-01

FOR USE ON MARK/DOOR #(S):
101A/VEST.

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	224HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	KEYED REMOVABLE MULLION	KR4954	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-EO	626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP-110MD	626	VON
1	EA	PRIMUS RIM CYLINDER	20-709	626	SCH
1	EA	PRIMUS MORT. CYL.	20-722	626	SCH
2	EA	90 DEG OFFSET PULL	8190HD 12" O	630	IVE
1	EA	SURF. AUTO OPERATOR	9542 MS	ANCLR	LCN
2	EA	ACTUATOR/BOLLARD PKG	8310-3836T	AL	LCN
1	EA	RELAY/DOOR SEQUENCER	8310-845	689	LCN
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	8655A	A	ZER
1	EA	CREDENTIAL READER	BLACKBOARD DR 4200		
1	EA	KEY SWITCH	653-04 L2	630	SCE
1	EA	DESK MOUNT BUTTON	660-T4 - LOCATED AT RECEPTION AREA DESK	628	SCE
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-BBK 900-2RS	LGR	VON
1			SEALS BY DOOR SUPPLIER		

AUTO OPERATOR TO BE SEQUENCED WITH DOOR INSIDE VESTIBULE.

DURING BUSINESS HOURS: STAFF TO TURN ON AND TURN OFF OPERATORS BY USING KEY SWITCH. DOORS NORMALLY CLOSED AND LOCKED VALID CREDENTIAL REQUIRED TO ENTER AND TO USE AUTO OPERATOR. UPON PRESENTATION OF VALID CREDENTIAL TO READER, LATCH BOLTS ON EXIT DEVICES WILL RETRACT AND PERMIT ENTRANCE.

TO USE AUTO OPERATOR, PRESENT VALID CREDENTIAL TO READER AND PRESS WALL MOUNTED AUTO ACTUATOR BUTTON. LATCH BOLT ON EXIT DEVICES WILL ELECTRICALLY RETRACT, PERMITTING DOORS TO AUTOMATICALLY OPEN PERMITTING INGRES..

AFTER BUSINESS HOURS: STAFF TO TURN OFF OPERATORS. VALID CREDENTIAL REQUIRED TO ENTER. UPON PRESENTATION OF VALID CREDENTIAL TO CARD READER, LATCH BOLTS ON EXIT DEVICES WILL RETRACT AND PERMIT ENTRANCE.

DOORS MAY BE REMOTELY UNLOCKED BY DESK MOUNTED PUSH BUTTON AT LOBBY DESK.

FREE EGRESS AT ALL TIMES.

COORDINATE WITH ELECTRICAL AND SECURITY SYSTEMS.

2. Revise the project manual by adding spec sheets/sections with the following project manual sheets as follows:

    1. Section 01 9113 GENERAL COMMISSIONING REQUIREMENTS
    2. Section 22 0800 COMMISSIONING OF PLUMBING SYSTEMS
    3. Section 23 0800 COMMISSIONING OF HVAC SYSTEMS
    4. Section 26 0800 COMMISSIONING OF ELECTRICAL SYSTEMS

B. REVISIONS TO DRAWINGS:

1. THE FOLLOWING FULL SIZE SHEETS ARE RE-ISSUED:

C3.0	LAYOUT PLAN	09.13.2017
C4.0	UTILITY PLAN	09.13.2017
C4.1	SANITARY SEWER PLAN AND PROFILE	09.13.2017
E0.2	SITE PLAN – POWER	09.13.2017
E1.1	FIRST FLOOR PLAN – LIGHTING	09.13.2017
E1.3	FLOOR PLAN – LIGHTING	09.13.2017
E2.1	FIRST FLOOR PLAN – POWER	09.13.2017
E3.1	FIRST FLOOR PLAN – SPECIAL SYSTEMS	09.13.2017
FP0.2	FIRE PROTECTION DETAILS	09.13.2017
FP1.1	FIRE PROTECTION PLAN – FIRST FLOOR	09.13.2017
M0.1	MECHANICAL LEGEND, NOTES AND SCHEDULES	09.13.2017
M4.1	ENLARGED MECHANICAL ROOM	09.13.2017
M4.2	ENLARGED MECHANICAL DETAILS AND SCHEMATICS	09.13.2017

C. BIDDER CLARIFICATION REQUESTS

RFI#	RFI	RESPONSE
24	We noticed that there is spray fire resistive material on this project, but the building is Type IIB, which requires no rating on structure. Please confirm whether SFRM is included in the project.	There is Spray Fireproofing Resistive Material on the project because of the 2 hour fire barrier separating the 2 story atrium (which is rated because there is exiting through the lobby) and the fire barriers in the project required to separate the shafts and required separation between the emergency electrical room. The G sheets show members that require SFRM in order to support the walls of the fire barriers.

25	Please clarify the deadline for substitution requests. The state guidelines are different than the pre-bid meeting minutes	Requests for substition shall be submitted 10 days prior to the bid date. This means that substitution requests are required to be received on or before September 18th at 2:00 pm. Please revise the prebid minutes #2.c.i to Say September 18th at 2:00 pm.
26	In section 08-4113 2.6A1a- Entrance Door Systems it calls for Thermal Construction which would be a 2" thickness not a 1 ¾" as referenced in the same section. Is this what is required or was this a carryover from previous Specs? This will also increase the cost of the doors.	2" doors are required. See revised spec section 08 4113 page 8 for correction. This was an error in the spec and has been corrected.
27	Do we need to submit a statement of compliance with specifications with the bid package before or after award in spec section 230900 Part 2 – Products 2.2 A?	The statement of compliance is to be submitted after award.
28	Is there a spec section 019113 that is referenced in the project manual? Is there a commissioning spec or requirements in general?	Commissioning specifications have been added ot the project manual in the Addendum for General, Mechanical, Electrical and Plumbing. Table of Contents has been revised to reflect.
29	On drawing A1.1A at Stair 2 it show a wall type C#-S01-a. Detail A1/A6.1 it shows a wall type of D0 00-b, and C3-S00-a. Please clarify which wall type is correct?	Wall types shown are correct. The entire Stair enclosure is encased by a rated partitions (A & C types, depending on what's next to them) The "D" partition is show where these walls are furred inside to conceal the edge of slab which the rated walls align with. Please note that there is a similar condition at the 2 story lobby walls.
30	Please clarify the finish for the dimensional letters on signage. Do you want medium bronze anodized or brushed black anodized?	Dimensional Letters shall be Brushed Black Anodized
31	Is the macrofiber dosage rate as called out on S1.1 and S1.2 correct? Can we substitute steel fiber for macrofiber?"	Yes, slabs-on-grade shall have macrofiber dosage of 7.5 pounds per cubic yard and slabs-on-deck shall have macrofiber dosage of 5 pounds per cubic yard. Pumpable mixes for both of these dosage rates are readily achievable. No, steel fiber may NOT be used in lieu of synthetic macrofiber

32	Doors # 101C and 101DD are on the door schedule on sheet A7.1. No door material is listed for these doors. Please advise door material.	Doors 101C and 101DD are to be wood doors.
33	Pairs of fire rated doors 105A and 105B have hardware set I-20 in specification section 08 7100. This set calls for one exit device per pair of doors. I think you need 2 exit devices per pair of doors. Please advise. Also there are no outside levers specified. I think levers should be added. Please advise.	Technically, only one panic on each set of doors would be required for exiting width required per door (47 people per double doors), but we are working on revision regarding pulls on the other side of the doors. This will be included in the next addendum.
34	Hardware set I-20 lists doors #S101. I cannot find doors S101 on the door schedule or plans. Has S101 been deleted?	There is no longer an S101 in the plans.
35	I see no key cards or fobs specified in section 08 710. Will that be provided by your security integrator?	This answer will be in the next addendum.
36	Are the Special Inspections being handled by the University or the GC?	The University will handle Special Inspections.
37	The specs list manual roller shades and motorized roller shades but the plans do not specify which is required in the auditorium. Do they want manual or motorized or a combination?	With the exception of the roller shades attached to doors, all rollers shades in this project are motorized.
38	C4.0 & P1.1 - Coordination Please confirm that the sanitary piping shown on the civil drawings is coordinated with plumbing drawings; Line weights.	The sanitary sewer location has been coordinated with P1.1. See revised utility sheets/addendum 2.
39	M2.1 & L-1.0 - Coordination The ODU's shown on the mechanical plans are not coordinated with the planting plan.	Reduce the LOES count from 24 to 20 in the area where the ODUs are shown L-1.0 Planting Plan. The ODU equipment required service clearance is to be maintained.
40	M4.1 - Dampers Do all the transfer ducts and F-2 duct require fire dampers in the rated walls?	Fire dampers have been added at required locations
41	P2.1 - WH-3 Is it acceptable to run the WH-3 drain pan to the adjacent utility drain box?	It is acceptable if there is enough room to provide a proper connection. In our experience these boxes do not have space for more than one (1) 1" drain line at best. This is why we show WH3 pan drain

		going to the floor drain provided for the ice machine.
42	C4.0 - Natural Gas Please provide the natural gas pipe size. Also, it doesn't appear to be connected at one end to the existing main.	The natural gas main relocation has been completed by piedmont natural gas, coordinated by the college. [The size is unknown to us.] The dashed line on our plan has been extended, but the contractor should note that the location of the line is only approximate and does not reflect the as-built condition.
43	E2.1 & FP1.1 - Coordination It doesn't appear there is power shown on the electric drawings for the electric bell shown on the fire protection drawings, just outside the Fire Pump Room.	This has been added to Sheet E2.1 included in Addendum 02.
44	FP1.1 - Detail Should there be a detail showing the 4" FDC pipe passing thru the floor (with link seal) and out from under the building?	A special detail for this pipe installation is not necessary. Installation will mimic that of the main fire protection water supply.
45	FP1.1 & C4.0 - Coordination It appears that the 4" FDC is by the fire protection contractor and site utility contractor because of the line weights underground. Should there be a note and / or different line weights?	The site utilities contractor will stub-up the 4" pipe from the free standing FDC into the building. It shall be picked up above the floor by the sprinkler contractor. Again, this shall be handled the same as the fire protection main water supply.
46	E0.2 - Coordination There is a note regarding providing a tamper switch at PIV location, however I can't find this on the civil drawings.	C4.0 in the bid set calls for a Tamper Switch on the PIV.
47	E1.1 - Lighting Is there a light (and power) required in the elevator pit?	See Detail #4 on Sheet E5.4.
48	E1.1 - Exit Lights Should there be exit lights in Auditorium 105 and Meeting 116 in the base bid (rather than in the alternates)?	This has been added to Sheets E1.1 and E1.3 included in Addendum 02.
49	E3.1-Fire Alarm Are pull stations required at the exits from Bulk Storage and/or Mechanical Room?	This has been added to Sheet E3.1 included in Addendum 02.

50	E5.9 & E0.2 - Coordination The raceways for the fire pump do not appear to be coordinated. The conduits are run to the electric room rather than the pump room.	See revised Sheet E0.2 for addition of the fire pump room and fire pump feeders. All of this information was shown correctly on the power riser.
51	M0.10 - Asphalt Patching The new hot/chilled water lines seem to get into existing parking spaces near where they tie into existing lines. No demo or patching is shown. Please clarify.	Revised C3.0/addendum 2 shows pavement/curb and gutter patch in this location.
52	C2.0 and C3.0 - Right of Way Demolition Plan C2.0, Layout Plan C3.0 and others the R/W Limit seems to have a "?" beside it. Is R/W location in question?	We could not locate the question marks referenced. Per the survey, the R/W limits are located “per Hwy MB 1 Pgs 52, 53”.
53	S3.2 and S3.1 - Foundations Please clarify which footings get "Typical Pilasters" as indicated in detail 10/S3.2 and which get pocketed as indicated in 16/S3.1	This answer will be in the next addendum.
54	S1.1 - Foundations Is recessed slab in Mechanical room to be sloped to drains?	Slope the area around the drain only, not the entire floor. A 4’x4’ area should suffice.
55	FP1.1 - Fire Protection Sprinkler Head will be required in the machine room less elevator pit per NFPA 13. I do not see where a smoke and heat detectors is called for in pit. Are they required?	This is a fire alarm question, which will not be on FP1.1. See Detail #4 on Sheet E5.4.
56	06 62 00 - PVC Pergola Please see attached specifcations for Cheyenne Company. Please confirm if they are considered an acceptable manufacturer for the PVC Pergola scope.	This substitution request was accepted in Addendum 01.

D. **SUBSTITUTION REQUESTS**

Signed substitution forms have been attached to this addendum. All substitution requests are to be submitted by General Contractors for consideration.

3	26 4113 - Lightning Protection	Substitution has been approved as noted.
4	26 3212 - Generator	Substitution has been approved.

END OF ADDENDUM 02

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DIVISION 02 - EXISTING CONDITIONS

DIVISION 03 - CONCRETE

DIVISION 04 - MASONRY

DIVISION 05 - METALS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

DIVISION 08 - OPENINGS

DIVISION 09 - FINISHES

DIVISION 10 - SPECIALTIES

DIVISION 11 - EQUIPMENT

DIVISION 12 - FURNISHINGS

DIVISION 13 - SPECIAL CONSTRUCTION

NOT APPLICABLE

DIVISION 14 - CONVEYING EQUIPMENT

VOLUME II

DIVISION 21 - FIRE SUPPRESSION

DIVISION 22 - PLUMBING

DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)

DIVISION 25 - INTEGRATED AUTOMATION

NOT APPLICABLE

DIVISION 26 - ELECTRICAL

DIVISION 27 - COMMUNICATIONS

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

DIVISION 31 - EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

DIVISION 33 - UTILITIES

REPORTS

GEOTECHNICAL ENGINEERING REPORT - UNC-CHARLOTTE ADMISSIONS CENTER; CHARLOTTE, NORTH CAROLINA AUGUST 11, 2016 TERRACON CONSULTANTS, INC.

REPORT OF PRELIMINARY SUBSURFACE EXPLORATION; UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE PARKING LOTS 8 AND 31.ECS CAROLINAS, LLP FEBRUARY 26, 2016 (INCLUDED FOR SITE AT UTITLITIES)

BID FORMS

F O R M O F P R O P O S A L

ADMISSIONS AND VISITORS CENTER

UNC CHARLOTTE

SCO-ID #15-12632-02A.

Contract:_____

Bidder: _____

Date:_____

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed. The bidder further declares that he and his subcontractors have fully complied with NCGS 64, Article 2 in regards to E-Verification as required by Section 2.(c) of Session Law 2013-418, codified as N.C. Gen. Stat. § 143-129(j).

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The Bidder proposes and agrees if this proposal is accepted to contract with the

State of North Carolina through the University of North Carolina at Charlotte

in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of

The Admissions and Visitors Center and associated Architectural, Site, Civil, Mechanical, Electrical, Plumbing, Telecom and Audiovisual scope as represented in the Construction Documents including but not limited to the Drawings and Project Manual with all Addenda included.

in full in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the State of North Carolina, and the

The University of North Carolina at Charlotte (UNC Charlotte)

with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the contract documents, for the sum of:

SINGLE PRIME CONTRACT:_____

Base Bid:

_____Dollars($)_____

General Subcontractor:

_____Lic_____

Plumbing Subcontractor:

_____Lic_____

Mechanical Subcontractor:

_____Lic_____

Electrical Subcontractor:

_____Lic_____

GS143-128(d) requires all single prime bidders to identify their subcontractors for the above subdivisions of work. A contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be non-responsible or non-responsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor.

ALTERNATES:

Should any of the alternates as described in the contract documents be accepted, the amount written below shall be the amount to be "added to" or "deducted from" the base bid. (Strike out "Add" or "Deduct" as appropriate.)

GENERAL CONTRACT:

Alternate No. 01: Irrigation

(Add) Dollars($)

Alternate No. 02: Landscape

(Add) Dollars($)

Alternate No. 03: Porch https://www.hafele.co.uk/en/product/plinth-clip-and-bracket-for-adjustable-plinth-feet-screw-fixing/63796371/?MasterSKU=0000001c0001ae4700020023

(Add) Dollars($)

Alternate No. 04a: Lobby & Corridor Floor Material – Porcelain Tile

(Add) Dollars($)

Alternate No. 04b: Lobby & Corridor Floor Material – Stone Tile

(Add) Dollars($)

Alternate No. 05a: Meeting Room 116 Upfit

(Add) Dollars($)

Alternate No. 05b: Auditorium 105 Upfit

(Add) Dollars($)

Alternate No. 06: Architectural Decorative Louvers - Exterior

(Add) Dollars($)

Alternate No. 07: Interior Trim

(Add) Dollars($)

Alternate No. 08: Lockers – Visit Suite

(Add) Dollars($)

Alternate No. 09: Admissions Office Suite Casework

(Add) Dollars($)

Alternate No. 10 : Lightning Protection

(Add) Dollars($)

(Alternate 11 has been removed)

Alternate No 12: Wall Sheathing

(Add) Dollars($)

OWNER PREFERRED ALTERNATES (OPA)

OPA #01: EXIT DEVICES

(Add) Dollars($)

OPA #2: DOOR CLOSERS

(Add) Dollars($)

OPA #3: AUTO OPENERS

(Add) Dollars($)

OPA #4: LOCKSETS

(Add) Dollars($)

OPA #5: ACCESS CONTROL

(Add) Dollars($)

OPA #6: BRICK PAVERS

(Add) Dollars($)

OPA #7: FACE BRICK

(Add) Dollars($)

OPA #8: FIRE ALARM SYSTEM

(Add) Dollars($)

OPA #9: AUDITORIUM LIGHTING CONTROL SYSTEM

(Add) Dollars($)

OPA #10: ELECTRICAL SWITHGEAR

(Add) Dollars($)

OPA #11: KNOX BOX

(Add) Dollars($)

OPA #12: KEY SYSTEMS SECURITY ACCESS MANAGEMENT SYSTEM

(Add) Dollars($)

UNIT PRICES

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents.

GENERAL CONTRACT:

Unit Price. 1 General Unsuitable Soils Excavation and Re-compaction
Unit Price ($)_____cu yd

Unit Price 2 General Trench Rock Excavation Rock and replacement with satisfactory soil
Unit Price ($)_____cu yard

Unit Price 3: Fire Alarm Devices

3a. Spot Smoke Detector……..	$_____ea .
3b. Spot Heat Detector (combination type – addressable).....……..	$_____ea .
3c. Spot Heat Detector fixed (with addressable monitor module)....…….	$_____ea .
3d. Addressable Pull Station.....……	$_____ea .
3e. Duct Smoke Detector, (access door and AHU shutdown)……	$_____ea .
3f. Speaker/Strobe…… ……	$_____ea .

3g. Strobe only (synchronous)…….	$_____ea.
Speaker/Strobe/Strobe…… ……..	$_____ea.
3h. Isolation Module……	$_____ea.
3i. Monitor Module…….	$_____ea.
Control	$_____ea.
3j. Module…….	
Magnetic Door Hold…….	$_____ea.

Unit Price 4: Exit Signs $_____ea.

Unit Price No. 5 - PVC Piping $_____LF.

The bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the designer and shall fully complete all work thereunder within the time specified in the Supplementary General Conditions Article 23. Applicable liquidated damages amount is also stated in the Supplementary General Conditions Article 23.

MINORITY BUSINESS PARTICIPATION REQUIREMENTS

Provide with the bid - Under GS 143-128.2(c) the undersigned bidder shall identify **on its bid** (Identification of Minority Business Participation Form) the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses. **Also** list the good faith efforts (Affidavit **A**) made to solicit minority participation in the bid effort.

NOTE: A contractor that performs all of the work with its own workforce may submit an Affidavit (**B)** to that effect in lieu of Affidavit (**A)** required above. The MB Participation Form must still be submitted even if there is zero participation.

After the bid opening - The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

An Affidavit (**C**) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort and Affidavit **D** is not necessary;

*** OR ***

If less than the 10% goal, Affidavit (**D**) of its good faith effort to meet the goal shall be provided. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

Note: Bidders must always submit **with their bid** the Identification of Minority Business Participation Form listing all MB contractors, vendors and suppliers that will be used. If there is no MB participation, then enter none or zero

on the form. Affidavit A **or** Affidavit B, as applicable, also must be submitted with the bid. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is grounds for rejection of the bid.

Proposal Signature Page

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bonds within ten (10) consecutive calendar days after being given written notice of the award of contract, the certified check, cash or bid bond accompanying this bid shall be paid into the funds of the owner's account set aside for the project, as liquidated damages for such failure; otherwise the certified check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Respectfully submitted this day of _____

_____
(Name of firm or corporation making bid)

WITNESS:

_____
(Proprietorship or Partnership)

By: _____
Signature

Name: _____
Print or type

Title _____
(Owner/Partner/Pres./V.Pres)

Address _____

_____

ATTEST:

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

License No. _____

Federal I.D. No. _____

Email Address: _____

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 _____ Addendum No. 3 _____ Addendum No. 5 _____ Addendum No. 6 _____

Addendum No. 2 _____ Addendum No. 4 _____ Addendum No. 6 _____ Addendum No. 7 _____

2. Alternate 05a: Meeting Room 116 to be upfit as indicated.
3. Alternate 05b: Auditorium 105 to be upfit as indicated.

F. Alternate No. 06 Architectural Decorative Grilles at Exterior Louvers

1. Base Bid: Mechanical Louvers on West Elevation as Indicated.
2. Alternate 06: As indicated on Sheet AA5.01 "Add Alternates #5, 8, and #9" Decorative Grilles (Prefinished Aluminum) in front of the Mechanical Louvers.Basis of Design - Airolite Sansome Grille or equal as indicated

G. Alternate No. 07: Interior Trim/SWP

1. Base Bid: No Interior Trim/SWP at Lobby & Auditorium
2. Alternate 07A: Provide and install painted wood trim with Stretched Wall Panel at Lobby and Exhibit 101 as indicated on Sheet AA5.0. Stretched Wall Panel Basis of Design is Novawall 1/2" system with acoustical backing (not tackable) Weltless Edge. Fabric Material to be priced at $35.00/SQ YD AVG.
3. Alternate 07B: Provide and install painted wood trim with Stretched Wall Panel at Auditorium 105 as indicated on Sheet AA5.0. Stretched Wall Panel Basis of Design is Novawall 1/2" system with acoustical backing (not tackable) Weltless Edge. Fabric Material to be priced at $35.00/SQ YD AVG.

H. Alternate No. 08:Lockers

1. Base Bid: No Lockers in Visit Suite Workroom Guide Space Room 114.
2. Alternate 08: As indicated on Sheet AA5.01 provide Eight (8) 2 high lockers. Locker Units to have 4" base, hasp locks and flat top (not sloped) with 2" end trim panels.

I. Alternate No. 09: Casework

1. Base Bid: Casework/Millwork at Lobby Reception Desk Only.
2. Alternate 08: Profile Level 2 Office Casework as indicated on Sheet AA5.01 "Add Alternates #5, 8 and #9.

J. Alternate No. 10: Lightning Protection

1. Base Bid: No lightning protection system
2. Alternate: Provide and install full lightning protection system.

~~K. Alternate No. 11: Fire Pump~~

~~1. Base Bid: No fire pump required~~
~~2. Alternate: GC to provide and install new fire pump.~~

L. Alternate No. 12: Wall Sheathing with Air Barrier

1. Base Bid: Exterior Sheathing to be 5/8” Glass Mat Sheathing. Vapor retarder is at the face of the insulation. Flashing to be be a face of insulation except where shown elsewhere. See Division 6 “Sheating” 06 1600

2.6 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 2-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior

2. Door Design: As indicated Wide stile; 5-inchnominal width.

a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

B. Entrance Door Hardware: As specified in Section 08 7100 "Door Hardware."

2.7 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 9200 "Joint Sealants."

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

SECTION 019113 GENERAL COMMISSIONING REQUIREMENTS

PART 1 – GENERAL

1.0 RELATED DOCUMENTS:

A. This section is a portion of the Contract Documents. All of the Contract Documents apply to this section. Related sections include the following:

1. Division 23 Section "Commissioning of HVAC Systems " for commissioning process activities for HVAC&R systems, assemblies, equipment, and components.

1.1 DESCRIPTION:

A. Commissioning is a systematic process of confirming that all building systems perform interactively according to the Owner's Program Requirements and the Basis of Design and continuing through construction, acceptance and the warranty period with actual verification of performance.

B. Commissioning during the construction phase of this project is intended to achieve the following specific objectives:

1. Provide direction for the commissioning process during construction, particularly providing resolution to issues and providing details not developed during design (ex. scheduling, participation of various parties, lines of reporting and approvals, coordination, etc.).
2. Verify that applicable equipment and systems are installed properly and receive adequate operational checkout by installing contractors.
3. Verify and document proper performance of equipment and systems.
4. Verify that O&M documentation left on site is complete.
5. Verify that the Owner's operating personnel are adequately trained.

C. The Commissioning process does not take away from or reduce the responsibility of the system designers to design a workable system nor the installing contractors to provide a finished and fully functioning product.

D. The CxA works with the Contractor according to established protocols to schedule the commissioning activities. The CxA will provide sufficient notice to the Contractor and Owner for scheduling commissioning activities. Meanwhile, the CxA will integrate these activities into the master construction schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

E. The following narrative provides a brief overview of the commissioning tasks during construction and the general order in which they occur:

1. Commissioning during construction begins with a Commissioning Kick-Off Meeting – Construction Team conducted by the CxA where the commissioning process is reviewed with the commissioning team members.
2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
3. Equipment documentation is submitted to the CxA through the submittal process, including detailed start-up procedures.
4. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with Prefunctional checklists being completed before functional testing begins.
5. The contractors, under their own direction, document and perform startup and initial checkout. The CxA documents that startup was completed according to the approved plans, when contracted. This may include the CxA witnessing start-up of selected equipment, if contracted.
6. The CxA verifies installation integrity through the use of checklists.
7. The CxA develops specific equipment and system functional performance test procedures. The contractors review the procedures.
8. The procedures are executed by the contractors, under the direction of, and documented by the CxA.
9. Items of non-compliance in material, installation or setup are corrected at the contractor's expense and the system retested.
10. The CxA reviews the O&M documentation for completeness.
11. Commissioning is completed before Substantial Completion, whenever possible.
12. The CxA reviews and pre-approves the training plan provided by the contractors.
13. The contractors coordinate and provide training via qualified instructors.
14. The Owner verifies that training has occurred and provides a written statement that training has occurred.
15. Deferred testing is conducted, as specified or required.

1.2 DEFINITIONS:

A. Acceptance: A formal action, to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.

B. Acceptance Phase: Phase of commissioning after start-up and initial checkout when functional performance tests, O&M documentation review and training occurs.

C. Architect/Engineer (AE): The prime Consultant (Architect) and Subconsultants who comprise the design team, generally the HVAC Mechanical Designer/Engineer, the Electrical Designer/Engineer and various other Subconsultants.

D. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the contract documents.

E. Basis of Design (BOD): A document that records concepts, calculations, decisions and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process. Also known as the Design Criteria.

F. Checklists: Verification checklists that are developed and used during all phases of the commissioning process to verify that the Owner's Project Requirements are being achieved. This includes checklists for general verification, plus testing, training, and other specific requirements.

G. Commissioning Authority (CxA): An entity identified by the Owner who plans, schedules and coordinates the commissioning team to implement the Commissioning Process. The Owner has engaged HEA Engineers, LLP as the CxA under a separate contract.

H. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

I. Commissioning Process: A quality-focused process for enhancing the delivery of a project and includes verifying and documenting that the facility and its systems and assemblies are planned, designed, installed, tested, operated and maintained to meet the Owner's Project Requirements.

J. Commissioning Process Progress Report: A written document that details activities completed as part of the commissioning process and significant findings from those activities that is continuously updated during the course of a project.

K. Commissioning Team: A team comprised of the CxA, Owner, AE, Construction Manager/General Contractor, Contractors, maintenance and operations personnel, and occupants. Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action.

L. Contract Documents: The documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.).

M. Contractor: The CM or subcontractors authorized representatives.

N. Controls System: The systems under Division 25 – Integrated Automation, also referred to as controls, Building Automation System (BAS), and Building Management System (BMS).

O. Construction Manager (CM): The prime contractor for this project. Generally refers to all the CM's subcontractors as well. Also referred to as the Contractor, in some contexts.

P. Deferred Performance Tests (DPTs): Performance tests that are performed, at the discretion of the CxA, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design, or other site conditions that disallow the test from being performed.

Q. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the Owner's Project Requirements).

R. Factory Testing: Testing of equipment on-site or at the factory, by factory personnel, with or without Owner's representative present.

S. Functional Performance Test: The testing of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation.

T. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

U. Issues Log: A formal and ongoing record of problems or concerns – and their resolution – that have been raised by members of the commissioning team during the course of the commissioning process.

V. Monitoring: The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.

W. Owner's Project Requirements (OPR): A written document that details functional requirements of the Project and the expectations of how the Project will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information. (Also formerly known as the Design Intent Document.)

X. Owner's Representative or Project Manager (Owner): The contracting and managing authority for the Owner who oversees the design and/or construction of the project.

Y. Sampling: Functionally testing only a fraction of the total number of identical or near identical pieces of equipment.

Z. Seasonal Performance Test: Performance tests that are deferred until the system(s) will experience conditions closer to their design conditions based on weather conditions.

AA. Simulated Condition: Condition that is created for the purpose of testing the response of a system (eg. Raising/lowering the set-point of a thermostat to see the response in a VAV box).

BB. Simulated Signal: Disconnecting a sensor and using a signal generator to simulate a sensor value for the purpose of testing a full range of conditions.

CC. Startup: The initial starting or activating of dynamic equipment, including completing construction checklists.

DD. Test Requirements: Requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents.

EE. Training Plan: A written document that details the expectations, schedule, budget and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users, and occupants.

FF. Trending: Monitoring over a period of time.

GG. Verification: The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the Owner's Project Requirements.

HH. Warranty Period: Warranty period for the entire project, including equipment components. Warranty begins at Substantial Completion and extends typically for at least one year, unless specifically noted otherwise in the Contract Documents.

1.3 SUBMITTALS:

A. The CxA will review and approve submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of functional testing procedures and only secondarily to verify compliance with equipment specifications. The CxA will notify the Contractor, Owner or AE as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.

B. The CxA will review the submittals once. The CxA will receive a copy of the final approved submittals.

1.4 QUALITY ASSURANCE:

A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.5 COORDINATION:

A. Commissioning Kick-Off Meeting – Construction Team: Contractors will attend a meeting of the Commissioning Team, chaired by the CxA, to review the scope of commissioning process activities and the Commissioning Plan with discussions on milestones, activities, and assignments of responsibilities. The flow and type of documents and the amount of submittal data given to the CxA will be determined. Meeting minutes will then be distributed to all parties by the CxA.

B. Commissioning Meetings: Contractors will attend coordination meetings with the Commissioning Team, chaired by the CxA, to review progress on the Commissioning Plan, construction deficiencies, scheduling conflicts, and to discuss strategies and processes for upcoming commissioning process activities.

C. Miscellaneous Construction Meetings: The CxA attends selected planning and job-site meetings in order to remain informed on construction progress and to update parties involved in the commissioning process.

D. Pre-testing Meetings: Contractors will attend pretest meetings with the Commissioning Team, chaired by the CxA, to review startup reports, pre-test inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.

E. Testing: Contractors will coordinate with testing personnel and agencies for timing and access for the CxA to witness test.

F. Manufacturers' Inspection and Startup Services: Contractors will coordinate services of manufacturers' inspection and startup services.

G. Testing, Adjusting and Balancing: Contractors will coordinate with plan and schedule for testing, adjusting and balancing for timing and access for the CxA to witness process.

PART 2 – TEST EQUIPMENT

2.0 TEST EQUIPMENT:

A. All standard testing equipment required to perform startup, initial checkout, and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the mechanical contractor of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC&R system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F.

Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 – EXECUTION

3.0 GENERAL DOCUMENTATION REQUIREMENTS:

A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems.

B. Operation and Maintenance Data: Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems. The CxA will review the O&M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

C. Demonstration and Training: Contractor will provide demonstration and training as required by the specifications. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any training. A training agenda for each training session must be submitted to the CxA one (1) week prior the training session.

3.1 CONTRACTOR'S RESPONSIBILITIES:

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following brief overview:

1. Facilitate the coordination of commissioning and incorporate commissioning activities into the overall project.
2. Provide copies of all applicable submittals as required in Division 01 including all changes thereto.
3. Provide detailed startup procedures.
4. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, perform corrective actions.
5. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
6. Attend commissioning team meetings held on a scheduled basis.
7. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CxA. Furnish a copy of the O&M literature to the CxA forty five (45) days after final equipment submittals.
8. In each purchase order or subcontract written, include requirements for submittal data, O&M literature, commissioning tasks and training.

9. Integrate and coordinate commissioning process activities with construction schedule.
10. Review and accept construction checklists provided by the CxA.
11. Review and accept commissioning process test procedures provided by the CxA.
12. Complete commissioning process test procedures.
13. Submit training plan for approval, coordinate training and provide qualified instructors for training of Owner personnel.
14. Assist the CxA as necessary in the seasonal testing, deferred testing a deficiency resolution.
15. Ensure that subcontractors correct deficiencies and make necessary adjustments to submittals, O&M manuals and red-lined drawings for applicable issues identified in any seasonal testing.

3.2 EQUIPMENT SUPPLIER'S RESPONSIBILITIES:

A. Roles and Responsibilities:

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner, to keep warranties in force.
2. Assist in equipment testing per agreements with subcontractors.
3. Provide information requested by the CxA regarding equipment sequence of operation and testing procedures.

3.3 OWNER'S RESPONSIBILITIES:

A. Provide the OPR documentation to the CxA and Contractors for use in developing the Commissioning Plan; testing plans and checklists.

B. Assign operation and maintenance personnel and schedule them to participate in Commissioning Team activities including, but not limited to, the following:

1. Commissioning meetings
2. Construction phase coordination meetings
3. Piping and ductwork testing and flushing verification meetings
4. Procedures meeting for testing, adjusting, and balancing
5. Testing and demonstration of systems, subsystems and equipment
6. Training in operation and maintenance of systems, subsystems and equipment
7. Final review and acceptance meetings

C. Provide utility services required for the commissioning process.

D. Facilitate the coordination of the commissioning work between the CxA, the Contractor and the Architect and Engineers to ensure that the commissioning activities are incorporated into the master schedule.

E. Review and approve the commissioning plan.

F. Coordinate any seasonal or deferred testing.

G. Ensure that any seasonal, deferred testing and/or deficiency issues are addressed.

3.4 COMMISSIONING AUTHORITY RESPONSIBILITIES:

A. Roles and Responsibilities:

1. The CxA is not responsible for the design concept, the design criteria, compliance with codes, design or general construction scheduling, cost estimating or construction management.
2. The CxA may assist with problem solving and non-conformance items or deficiencies, but the CxA is not the Design Engineer / Engineer of Record, and the commissioning process does not preclude the design engineer / Engineer of Record of responsibilities for system evaluations, adequacy of systems to meet the OPR, capacities of systems, quality control checks, or any of the other elements and recommended final acceptance of systems to the Owner.
3. The primary role of the CxA is to coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultants with all necessary parties, frequently updated timelines and schedules and technical expertise.

B. Commissioning Plan:

1. The CxA shall develop a Commissioning Plan at the start of the project. The Commissioning Plan shall outline the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.
2. The Commissioning Plan shall be a “living document” in which information is added to or modified by the Commissioning Team during the course of the Project.
3. At the end of the Project, the CxA shall provide the Owner with the Final Commissioning Plan for the Owner’s use.

C. Document Review:

1. Review the Owner’s Project Requirements and Basis of Design developed by the design professionals.
2. Develop full commissioning specifications for all systems and equipment to be commissioned. The commissioning specifications will be subject to approval of the design team and included in the final construction specifications.

D. Cx Team Meetings:

1. Commissioning during construction will begin with a ‘Commissioning Kick-Off Meeting – for Construction Team’ conducted by the CxA where the commissioning process is reviewed with all of the commissioning team members.
2. Additional meetings will be required throughout construction, and will be scheduled by the CxA on a weekly basis with necessary parties of the commissioning team attending, in order to plan, scope, coordinate, and schedule future activities and resolve problems.

E. Coordination and Scheduling:

1. Coordinate and direct commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications, and consultations with all necessary parties.
2. Coordinate commissioning work with the Contractor to ensure that commissioning activities are being scheduled into the master project schedule.

F. Commissioning Progress:

1. Perform site visits, as necessary, to observe component and system installations.
2. Attend selected planning and jobsite meetings to obtain information on construction progress.
3. Review construction meeting minutes for revisions/substitutions relating to the commissioning process.

G. Pipe Testing, Flushing and Cleaning:

1. Review and approve the pipe testing, flushing and cleaning plan submitted by the Contractor.
2. Witness all or part of the pipe testing, flushing and cleaning and be sufficiently confident that proper procedures are being followed.
3. Document via the online Commissioning Issues Log any deficiencies in the procedures or results.

H. Pre-Functional Checks:

1. Verify proper installation of components, equipment, systems and assemblies. Sampling procedures may NOT be employed on systems and equipment.

I. Equipment and System Startup and Verification:

1. Review and approve component, equipment, system, and assembly startup plan developed and submitted by the Contractor.
2. Approve system startup by reviewing startup reports, if contracted; and by selected site observation.
3. Review the Testing, Adjusting and Balancing execution plan for the project, which shall be submitted by the TAB subcontractor.
4. Verify and document the accuracy of the air and water systems balancing by spot testing the air and water reported field values with TAB subcontractors and by reviewing completed reports.

J. Functional Performance Testing:

1. With assistance from the Contractor, write Functional Performance Testing procedures for all components, equipment or systems to be commissioned.
2. With the assistance of the Contractors, coordinate Functional Performance Testing. Witness and approve Functional Performance Testing performed by the Contractors.
3. With the assistance of the Contractors, coordinate retesting as necessary until satisfactory performance is achieved.
4. Witness seasonal or deferred Functional Performance Testing as necessary.

K. Issue/Deficiency Logs:

1. The CxA shall prepare a formal, ongoing, online record of deficiencies, problems and concerns – and their resolution – raised by members of the Commissioning Team during the Commissioning Process.
2. Issues will be recorded on an online Commissioning Issues Log for the AE and Contractors to resolve to the satisfaction of the Owner. Issues will be added by the CxA. Team members are required to post their own responses to issues pertaining to their work. Team members are required to respond to issues added to the list within five (5) working days of being added by the CxA.
3. Issues will be revisited one (1) time to verify that the proper corrections have been made. The Owner reserves the right to deduct from the Contractors' contract costs associated with additional revisits required for outstanding issues.
4. When issues are resolved, they will be closed on the Issues Log by the CxA.

L. Operation and Maintenance Data:

1. The CxA shall review of the documentation submitted by the Contractor as required by the Specifications for completeness and accuracy. This commissioning review supplements, but does not replace, the Architect/Engineer's review.
2. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.

M. Training:

1. The CM/GC and Contractors will provide all documentation and qualified training personnel for training.
2. The CxA will verify through the Contractor's plan and schedule, training agendas, and select observations that proper training procedures were followed on all commissioned systems.
3. See appropriate section below pertaining to training.

N. Post Occupancy Review:

1. The CxA will return to the site within the 12-month warranty period to address the following: review current building operations with facility staff and address outstanding issues related to the Owner's Project Requirements; Interview facility staff and identify problems or concerns with operating the building; Identify problems covered under warranty or under the original construction contract.
2. The CxA will make suggestions for improvements in the content of the O&M Manuals. Any required changes shall be made by the contractor responsible for that section.
3. The CxA shall assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

O. Commissioning Final Report:

1. The CxA shall provide a final report following the completion of all Functional Performance Testing. The report is to outline compliance and non-compliance to the construction documents, as well as identify concerns relative to future performance.

3.5 GENERAL TESTING REQUIREMENTS:

A. Prefunctional checklists are important to ensure that the equipment and systems are installed and operational. They ensure that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full Prefunctional checkout. The Prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system. HEA shall complete the Pre-Functional checks in the field, with assistance from the installing Contractors (where necessary).

B. The installing contractors, under the direction of the CxA, shall perform Functional Performance Testing of systems and sub-system performance after Pre-Functional checks have been completed and all outstanding issues resolved.

C. The installing contractor will perform tests specified in Division 1 commissioning process activity Sections and other sections specifying testing procedures according to approved testing procedures.

1. Verify and test performance using actual conditions whenever possible.
2. Simulate conditions by imposing an artificial load when it is not practical to test under actual conditions. Set and document simulated conditions and methods of simulation. After test, return settings to normal operating conditions.
3. Alter set points when simulating conditions is not practical.

D. The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the Contractors for review and comment.

E. Deficiencies/Non-Conformance:

1. The CxA will record the results of the functional test on the test form. All deficiencies or non-conformance items shall be noted and reported to the Owner and Contractors on a standardized form.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA.
3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.
4. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
5. When there is no dispute on the deficiency and the contractor accepts responsibility to correct it, the CxA documents the deficiency and the contractor’s response and intentions or corrections. The CxA and contractor then proceed to another test or sequence. Once the contractor corrects the deficiency, the test is rescheduled and repeated in the anticipation of correct operation or function. If a deficiency is identified, the cost of retesting will be as per this section.

6. When there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible, the CxA documents the deficiency and the contractor's response. The deficiency is then forwarded to parties assumed to be responsible for the deficiency. Resolutions are made at the lowest management level possible. Other parties are brought into the discussion as needed. Final interpretive authority is with the AE. Final acceptance authority is with the Owner and the CxA. The CxA will then document the resolution process. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency. The CxA then reschedules the test as stated in the section above. Costs of retesting are as stated below in the applicable section.

F. Cost of Retesting:

1. The cost for the contractor to retest a prefunctional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the Contractor.

2. For a deficiency identified, not related to any Prefunctional checklist or start-up fault, the following shall apply: the CxA will direct the retesting of the equipment once at no "charge" to the Contractor for their time. However, the CxA and owner's time for a second retest will be charged to the Contractor, who may choose to recover costs from the responsible contractor or subcontractor. Before retesting occurs, the Contractor will inspect the deficiency and respond to the CxA that the issue has been addressed.
3. The time for the CxA and owner to direct any retesting required because a specific Prefunctional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the CM/GC, who may choose to recover costs from the party responsible for misinformation or deficiency.
4. The contractor shall respond in writing to the CxA and owner at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
5. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor or subcontractors.

G. Failure due to Manufacturer Defect:

1. If 10% or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the Contractor, the CxA, or Owner. In such case, the Contractor shall provide the Owner with the following.
2. Within one week of notification from the Contractor or Owner, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the Contractor or Owner within two weeks of the original notice.
3. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.

4. The Contractor, the CxA, or Owner will determine whether a replacement of all identical units or a repair is acceptable.
5. Two examples of the proposed solution will be installed by the Contractor and the Contractor will be allowed to test the installations for up to one week, upon which the CxA or owner will decide whether to accept the solution.
6. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

H. Approval:

1. The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA. The CxA recommends acceptance of each test to the Owner using a standard form.

I. Deferred Testing:

1. Unforeseen Deferred Testing – If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the Owner. These tests will be conducted in the same manner as the seasonal tests, as soon as possible. Services of necessary parties will be negotiated.
2. Seasonal Testing - During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate contractors, with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and record documents due to seasonal testing will be made by the contractor.

3.6 SYSTEMS TO BE COMMISSIONED:

A. Refer to individuals sections listed in Section 1.0 – Related Documents for specific systems to be commissioned.

3.7 OPERATION AND MAINTENANCE MANUALS:

A. The specific content and format requirements for the standard O&M manuals are detailed in Division 01.

B. AE Contribution – The AE will include in the beginning of the O&M manuals a separate section describing the systems including the Basis of Design prepared by the AE. They will also provide Simplified professionally drawn single line system diagrams on 8 ½" x 11" or 11" x 17" sheets. These shall include (ex. chillers/hot water system(s), condenser water system, supply air systems, exhaust systems, etc.). These shall show major pieces of equipment such as (ex. pumps, chillers, heat exchangers, control valves, expansion tanks, coils, service valves, etc.).

C. The CxA Review and Approval - Prior to substantial completion, the CxA shall review the O&M manuals, documentation, and record documents for systems that were commissioned to verify compliance with the Specifications. The CxA will communicate deficiencies in the manuals to the Contractor, Owner, or AE, as requested. Upon a successful review of the corrections, the CxA recommends approval and acceptance of these sections of the O&M manuals to the Contractor, Owner, or AE. The CxA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the AE's review of the O&M manuals according to the AE's contract.

3.8 TRAINING OF OWNER PERSONNEL:

A. The Contractors shall be responsible for training coordination, scheduling and ultimately for ensuring that training is completed.

B. The CxA shall oversee the training of Owner's personnel for commissioned equipment and systems.
   1. The CxA shall interview the Owner's staff to determine the special needs and areas where training will be most valuable. The Owner and the CxA shall decide how rigorous the training should be for each piece of commissioned equipment. The CxA shall communicate the results to the Contractor, who will in turn communicate to the subcontractors and vendors who also have training responsibilities.
   2. Each Sub and vendor responsible for training will submit a written training plan to the CxA and Owner for review and approval prior to training. The Contractor will submit one comprehensive training plan to the CxA and Owner.
   3. The plan will be reviewed by the CxA and Owner. Comments pertaining to its deficiencies will be forwarded to the CM/GC and Contractors. The training plan will be rewritten until approved by the CxA and Owner The final approved training plan will cover the following elements:
      a. Equipment (included in training)
      b. Intended audience
      c. Location of training
      d. Objectives
      e. Subjects covered (description, duration of discussion, special methods, etc.)
      f. Duration of training on each subject
      g. Qualified instructor for each subject
      h. Instructor qualifications
      i. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
   4. For the primary HVAC equipment, the Controls Subcontractor shall provide a discussion of the control of the equipment during the mechanical or electrical training conducted by each subcontractor or vendor.
   5. Training documentation shall include the following items:
      a. Copy of the training plan, including schedule, syllabus, and agenda
      b. Copy of the Owner's Program Requirements
      c. Copy of the Basis of Design
      d. Compiled operations manuals
      e. Compiled maintenance manuals

f. Completed manufacturer training manuals
g. Other pertinent documents

6. The CxA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA recommends approval of the training to the Owner using a standard form. The owner signs the approval form/letter template.
7. At one of the training sessions, the CxA presents a presentation discussing the use of the blank functional test forms for re-commissioning equipment.
8. Videotaping of the training sessions in DVD format will be provided by the Contractor, with disks cataloged by the Contractor and added to the O&M manuals, if required by Division 1 specifications.
9. The mechanical design engineer shall at the first training session present the overall system design concept and the design concept of each equipment section. This presentation shall be one to two hours in length and include a review of mechanical systems using the simplified system schematics (one-line drawings).

3.9 REPORTING:

A. The CxA will provide regular reports to the Owner, on a pre-determined frequency in accordance with the project schedule. The CxA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through, memos, progress reports, etc.
B. The CxA will keep all documentation and log all commissioning-related issues that require current or future attention including deficiencies. An agreed-upon form will track the status of documentation and testing for each piece of equipment and system.

3.10 COMMISSIONING DOCUMENTATION:

A. The CxA oversees and maintains the development of commissioning documentation. The commissioning documentation shall be kept in three ring binders, and organized by system and sub-system when practical. All pages shall be numbered, and a table of contents page(s) shall be provided. The commissioning documentation shall include, but not be limited to, the following:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that systems, subsystems, equipment, and associated controls are ready for testing.

6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.
9. Approved final test and balance report for the building being commissioned.
10. All accepted shop drawings of systems equipment. Shop drawings shall be full size sheets folded as required to fit in binders.
11. All pre-functional performance test checklists, signed by personnel performing and/or witnessing test, organized by system and sub-system.
12. All verification and functional performance test checklists/results signed by personnel performing and/or witnessing test, organized by system and sub-system. This information may be used for calibrating the original energy simulation model. The revised model will be used to create the baseline for energy use in the building.

End of Section

SECTION 220800 COMMISSIONING OF PLUMBING SYSTEMS

PART 1 – GENERAL

1.0 RELATED DOCUMENTS:

A. This section is a portion of the Contract Documents. All of the Contract Documents apply to this section. Refer to Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.1 SECTION INCLUDES:

A. Commissioning process requirements for Plumbing systems, assemblies, and equipment.

1.2 DESCRIPTION AND DEFINITIONS:

A. Refer to Division 01 Section “General Commissioning Requirements” for the description of commissioning and associated definitions.

1.3 SUBMITTALS:

A. Refer to Division 01 Section “Submittals” for specific requirements. In addition, provide the following:

1. Certificates of readiness
2. Certificates of completion of installation, prestart, and startup activities
3. O&M manuals
4. Test reports

1.4 QUALITY ASSURANCE:

A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer’s calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.5 COORDINATION:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to coordination during the commissioning process.

PART 2 – TEST EQUIPMENT

2.1 TEST EQUIPMENT:

A. All standard testing equipment required to perform startup, initial checkout, and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the mechanical contractor of Division 22 shall ultimately be responsible for all standard testing equipment for the Plumbing system and controls system in Division 22.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 – EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS:

A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems.

B. Operation and Maintenance Data: Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems. The CxA will review the O&M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

C. Demonstration and Training: Contractor will provide demonstration and training as required by the specifications. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any training. A training agenda for each training session must be submitted to the CxA one (1) week prior the training session.

3.2 CONTRACTOR'S RESPONSIBILITIES:

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meetings.

C. Provide information requested by the CxA for final commissioning documentation.

D. Include requirements for submittal data, operation and maintenance data, and training in each purchase order or sub-contract written.

E. Prepare preliminary schedule for Mechanical system orientations and inspections, operation and maintenance manual submissions, and training sessions. Distribute preliminary schedule to commissioning team members.

F. Update schedule as required throughout the construction period.

G. Assist the CxA in all verification and functional performance tests.

H. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to the CxA 45 days after submittal acceptance.

I. Coordinate with the CxA to provide 48-hour advance notice so that the witnessing of equipment and system start-up and testing can begin.

J. Participate in, and schedule vendors and contractors to participate in the training sessions.

K. The equipment supplier shall document the performance of his equipment.

L. Refer to Division 01 Section “General Commissioning Requirements” for additional contractor responsibilities.

3.3 OWNER’S RESPONSIBILITIES:

A. Refer to Division 01 Section “General Commissioning Requirements” for Owner’s Responsibilities.

3.4 TESTING PREPARATION:

A. Certify in writing to the CxA that Plumbing systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that Plumbing instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.5 GENERAL TESTING REQUIREMENTS:

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of Plumbing testing shall include entire Plumbing installation.

C. Test all operating modes.

D. The CxA along with the Plumbing contractor shall prepare detailed testing plans, procedures, and checklists for Plumbing systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions.

G. If tests cannot be completed because of a deficiency outside the scope of the Plumbing system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

3.6 PLUMBING SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES:

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 22 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:

1. Domestic Water System (Heaters, Valves, Pumps)
2. Chilled Water Piping
3. Hot Water Piping

3.7 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.8 APPROVAL:

A. Refer to Division 01 Section “General Commissioning Requirements” for approval procedures.

3.9 DEFERRED TESTING:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deferred testing.

3.10 OPERATION AND MAINTENANCE MANUALS:

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.

B. Refer to Division 01 Section “General Commissioning Requirements” for the Engineer and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.

3.11 TRAINING OF OWNER PERSONNEL:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to training.

End of Section

SECTION 23 0800 COMMISSIONING OF HVAC SYSTEMS

PART 1 – GENERAL

1.0 RELATED DOCUMENTS:

A. This section is a portion of the Contract Documents. All of the Contract Documents apply to this section. Refer to Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.1 SECTION INCLUDES:

A. Commissioning process requirements for HVAC&R systems, assemblies, and equipment.

1.2 DESCRIPTION AND DEFINITIONS:

A. Refer to Division 01 Section “General Commissioning Requirements” for the description of commissioning and associated definitions.

1.3 SUBMITTALS:

A. Refer to Division 01 Section “Submittals” for specific requirements. In addition, provide the following:

1. Certificates of readiness
2. Certificates of completion of installation, prestart, and startup activities
3. O&M manuals
4. Test reports

1.4 QUALITY ASSURANCE:

A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer’s calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.5 COORDINATION:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to coordination during the commissioning process.

PART 2 – TEST EQUIPMENT

2.1 TEST EQUIPMENT:

A. All standard testing equipment required to perform startup, initial checkout, and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the mechanical contractor of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC&R system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 – EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS:

A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems.

B. Operation and Maintenance Data: Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems. The CxA will review the O&M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

C. Demonstration and Training: Contractor will provide demonstration and training as required by the specifications. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any training. A training agenda for each training session must be submitted to the CxA one (1) week prior the training session.

3.2 CONTRACTOR'S RESPONSIBILITIES:

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase controls coordination meetings.

C. Attend testing, adjusting, and balancing review and coordination meetings.

D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Include requirements for submittal data, operation and maintenance data, and training in each purchase order or sub-contract written.

G. Prepare preliminary schedule for Mechanical system orientations and inspections, operation and maintenance manual submissions, training sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, testing and balancing and task completion for owner. Distribute preliminary schedule to commissioning team members.

H. Update schedule as required throughout the construction period.

I. Assist the CxA in all verification and functional performance tests.

J. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

K. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to the CxA 45 days after submittal acceptance.

L. Coordinate with the CxA to provide 48-hour advance notice so that the witnessing of equipment and system start-up and testing can begin.

M. Participate in, and schedule vendors and contractors to participate in the training sessions.

N. The equipment supplier shall document the performance of his equipment.

O. Refer to Division 01 Section "General Commissioning Requirements" for additional contractor responsibilities.

3.3 OWNER'S RESPONSIBILITIES:

A. Refer to Division 01 Section "General Commissioning Requirements" for Owner's Responsibilities.

3.4 TESTING PREPARATION:

A. Certify in writing to the CxA that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify in writing to the CxA that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

D. Inspect and verify the position of each device and interlock identified on checklists.

E. Check safety cutouts, alarms, and interlocks with life-safety systems during each mode of operation.

F. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.5 GENERAL TESTING REQUIREMENTS:

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the HVAC&R contractor, testing and balancing Subcontractor, and HVAC&R Instrumentation and Control Subcontractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.6 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES:

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 23 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests and chemical treatment: Test requirements are specified in Division 23 piping Sections. HVAC&R Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

F. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

G. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:

1. Air handling units (supply fans, return fans, coils, valves, vfd's and accessories)
2. Ductwork
3. Exhaust Fans
4. Terminal Units
5. Building Management System

3.7 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT:

A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.8 APPROVAL:

A. Refer to Division 01 Section "General Commissioning Requirements" for approval procedures.

3.9 DEFERRED TESTING:

A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to deferred testing.

3.10 OPERATION AND MAINTENANCE MANUALS:

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.

B. Refer to Division 01 Section "General Commissioning Requirements" for the Engineer and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.

3.11 TRAINING OF OWNER PERSONNEL:

A. Refer to Division 01 Section "General Commissioning Requirements" for requirements pertaining to training.

End of Section

SECTION 260800 COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.0 RELATED DOCUMENTS:

A. This section is a portion of the Contract Documents. All of the Contract Documents apply to this section. Refer to Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.1 SECTION INCLUDES:

A. Commissioning process requirements for Electrical systems, assemblies, and equipment.

1.2 DESCRIPTION AND DEFINITIONS:

A. Refer to Division 01 Section “General Commissioning Requirements” for the description of commissioning and associated definitions.

1.3 SUBMITTALS:

A. Refer to Division 01 Section “Submittals” for specific requirements. In addition, provide the following:

1. Certificates of readiness
2. Certificates of completion of installation, prestart, and startup activities
3. O&M manuals
4. Test reports

1.4 QUALITY ASSURANCE:

A. Test Equipment Calibration Requirements: Contractors will comply with test manufacturer’s calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damaged. Affix calibration tags to test instruments. Furnish calibration records to CxA upon request.

1.5 COORDINATION:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to coordination during the commissioning process.

PART 2 – TEST EQUIPMENT

2.1 TEST EQUIPMENT:

A. All standard testing equipment required to perform startup, initial checkout, and functional performance testing shall be provided by the Contractor for the equipment being tested. For example, the electrical contractor of Division 26 shall ultimately be responsible for all standard testing equipment for the electrical system in Division 26.

B. Special equipment, tools and instruments (specific to a piece of equipment and only available from vendor) required for testing shall be included in the base bid price to the Owner and left on site, except for stand-alone data logging equipment that may be used by the CxA.

C. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon completion of the commissioning process.

D. Data logging equipment and software required to test equipment will be provided by the CxA, but shall not become the property of the Owner.

E. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.

PART 3 – EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS:

A. With assistance from the installing contractors, the CxA will prepare Pre-Functional Checklists for all commissioned components, equipment, and systems.

B. Operation and Maintenance Data: Contractor will provide a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for all commissioned equipment and systems. The CxA will review the O&M literature once for conformance to project requirements. The CxA will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

C. Demonstration and Training: Contractor will provide demonstration and training as required by the specifications. A complete training plan and schedule must be submitted by the contractor to the CxA four weeks (4) prior to any training. A training agenda for each training session must be submitted to the CxA one (1) week prior the training session.

3.2 CONTRACTOR'S RESPONSIBILITIES:

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase coordination meetings.

C. Participate in Electrical systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

D. Provide information requested by the CxA for final commissioning documentation.

E. Include requirements for submittal data, operation and maintenance data, and training in each purchase order or sub-contract written.

F. Prepare preliminary schedule for Electrical system orientations and inspections, operation and maintenance manual submissions, and training sessions. Distribute preliminary schedule to commissioning team members.

G. Update schedule as required throughout the construction period.

H. Assist the CxA in all verification and functional performance tests.

I. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

J. Gather operation and maintenance literature on all equipment, and assemble in binders as required by the specifications. Submit to the CxA 45 days after submittal acceptance.

K. Coordinate with the CxA to provide 48-hour advance notice so that the witnessing of equipment and system start-up and testing can begin.

L. Participate in, and schedule vendors and contractors to participate in the training sessions.

M. The equipment supplier shall document the performance of his equipment.

N. Refer to Division 01 Section "General Commissioning Requirements" for additional contractor responsibilities.

3.3 OWNER'S RESPONSIBILITIES:

A. Refer to Division 01 Section "General Commissioning Requirements" for Owner's Responsibilities.

3.4 TESTING PREPARATION:

A. Certify in writing to the CxA that Electrical systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Place systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

C. Inspect and verify the position of each device and interlock identified on checklists.

D. Check safety cutouts, alarms, and interlocks with life-safety systems during each mode of operation.

E. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.5 GENERAL TESTING REQUIREMENTS:

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of Electrical testing shall include entire Electrical installation. Testing shall include measuring capacities and effectiveness of operational and control functions.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the Electrical contractor shall prepare detailed testing plans, procedures, and checklists for Electrical systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

H. If tests cannot be completed because of a deficiency outside the scope of the Electrical system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

I. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.6 ELECTRICAL SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES:

A. Equipment Testing and Acceptance Procedures: Testing requirements are specified in individual Division 26 sections. Provide submittals, test data, inspector record, and certifications to the CxA.

B. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of all components, systems and sub-systems. The following equipment and systems shall be evaluated:

1. HVAC and Plumbing – ancillary electrical devices

3.7 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.

3.8 APPROVAL:

A. Refer to Division 01 Section “General Commissioning Requirements” for approval procedures.

3.9 DEFERRED TESTING:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to deferred testing.

3.10 OPERATION AND MAINTENANCE MANUALS:

A. The Operation and Maintenance Manuals shall conform to Contract Documents requirements as stated in Division 01.
B. Refer to Division 01 Section “General Commissioning Requirements” for the Engineer and CxA roles in the Operation and Maintenance Manual contribution, review and approval process.

3.11 TRAINING OF OWNER PERSONNEL:

A. Refer to Division 01 Section “General Commissioning Requirements” for requirements pertaining to training.

End of Section

GENERAL LAYOUT NOTES:

1. ALL EXPANSION JOINTS ARE TO BE SEALED. REFER TO SPECIFICATIONS.
2. ALL DIMENSIONS ARE TO FACE OF CURB OR TO FINISHED FACE OF BUILDING UNLESS OTHERWISE NOTED.
3. ALL CURB RADII SHALL BE 2'-6" UNLESS OTHERWISE NOTED.
4. IN ORDER TO ENSURE PROPER DRAINAGE, KEEP A MINIMUM OF 0.5% SLOPE ON THE CURB.
5. STORM DRAINAGE INLETS AND MANHOLE COORDINATES ARE LOCATED AT CENTER OF GRATE OR MANHOLE. PIPE LENGTHS ARE GIVEN FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
6. ANY BUILDING DIMENSIONS SHOWN ARE NOMINAL. CONSULT ARCHITECTURAL PLANS BEFORE ACTUAL FIELD STAKING.
7. MAXIMUM ELEVATION CHANGE AT HANDICAP ACCESSIBLE DOORS SHALL NOT EXCEED 1/2".
8. ALL ACCESSIBLE ROUTES SHALL HAVE A MAX. CROSS SLOPE OF 1/4" PER FOOT.
9. NO PAVEMENT STRIPING SHALL OCCUR UNTIL AFTER PAVING HAS CURED 30 DAYS. ALL PAVEMENT MARKINGS WITHIN THE HIGHRISE LANE AND CAMERON BLVD. ARE TO BE THERMOPLASTIC.
10. ALL HANDICAP PARKING SPACES AND ACCESS AISLES SHALL MAINTAIN A MAXIMUM SLOPE OF 1/4" PER 1' IN ANY DIRECETION PER THE NC ACCESSIBILITY CODE.
11. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO EXCAVATION OR MATERIAL INSTALLATION.
12. PROTECT ALL EXISTING UTILITIES TO REMAIN DURING ALL CONSTRUCTION ACTIVITIES.

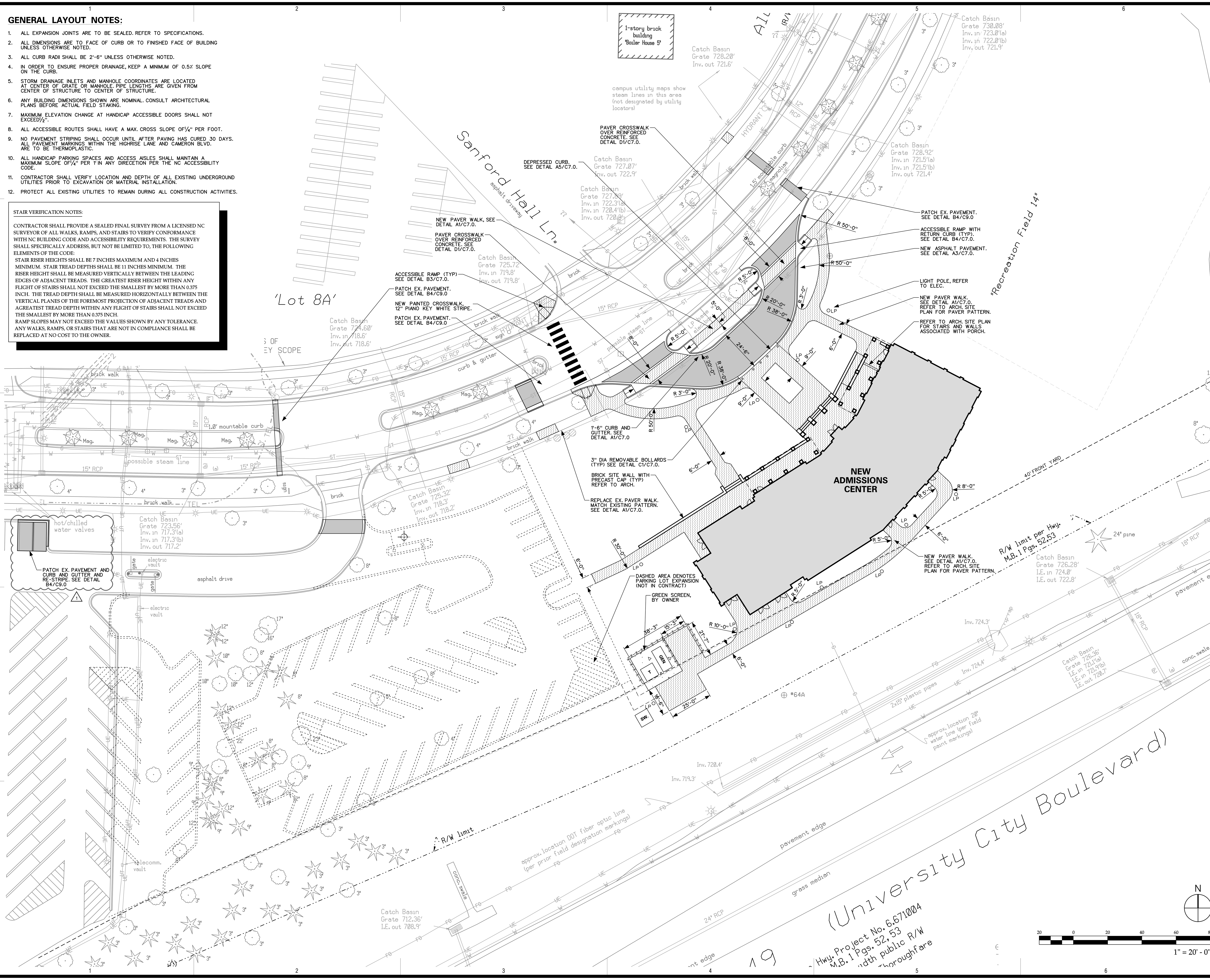
STAIR VERIFICATION NOTES:

CONTRACTOR SHALL PROVIDE A SEALED FINAL SURVEY FROM A LICENSED NC SURVEYOR OF ALL WALKS, RAMPS, AND STAIRS TO VERIFY CONFORMANCE WITH NC BUILDING CODE AND ACCESSIBILITY REQUIREMENTS. THE SURVEY SHALL SPECIFICALLY ADDRESS, BUT NOT BE LIMITED TO, THE FOLLOWING ELEMENTS OF THE CODE:

STAIR RISER HEIGHTS SHALL BE 7 INCHES MAXIMUM AND 4 INCHES MINIMUM. STAIR TREAD DEPTHS SHALL BE 11 INCHES MINIMUM. THE RISER HEIGHT SHALL BE MEASURED VERTICALLY BETWEEN THE LEADING EDGES OF ADJACENT TREADS. THE GREATEST RISER HEIGHT WITHIN ANY FLIGHT OF STAIRS SHALL NOT EXCEED THE SMALLEST BY MORE THAN 0.375 INCH. THE TREAD DEPTH SHALL BE MEASURED HORIZONTALLY BETWEEN THE VERTICAL PLANES OF THE FOREMOST PROJECTION OF ADJACENT TREADS AND AGREATEST TREAD DEPTH WITHIN ANY FLIGHT OF STAIRS SHALL NOT EXCEED THE SMALLEST BY MORE THAN 0.375 INCH.

RAMP SLOPES MAY NOT EXCEED THE VALUES SHOWN BY ANY TOLERANCE.

ANY WALKS, RAMPS, OR STAIRS THAT ARE NOT IN COMPLIANCE SHALL BE REPLACED AT NO COST TO THE OWNER.



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1	9.13.2017	ADDENDUM 02

LAYOUT PLAN

1604
WTS PROJECT NO.

C3.0
SHEET

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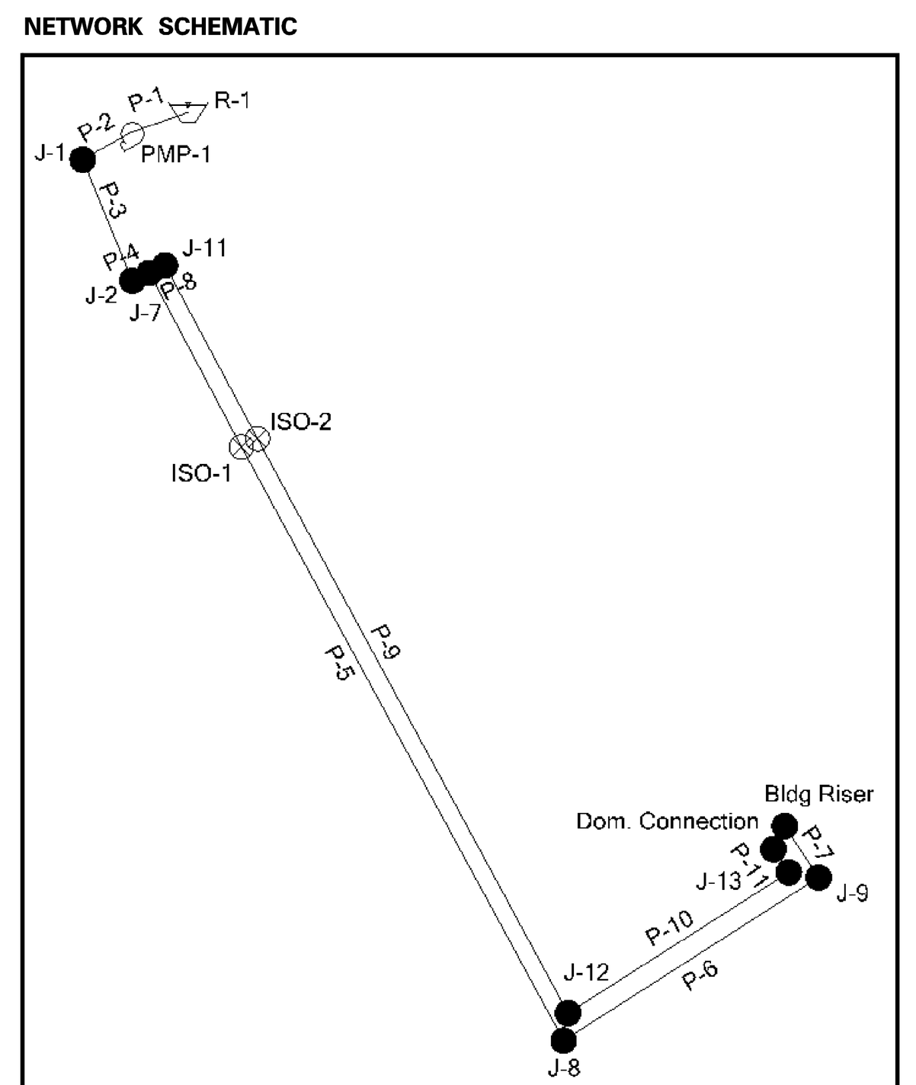
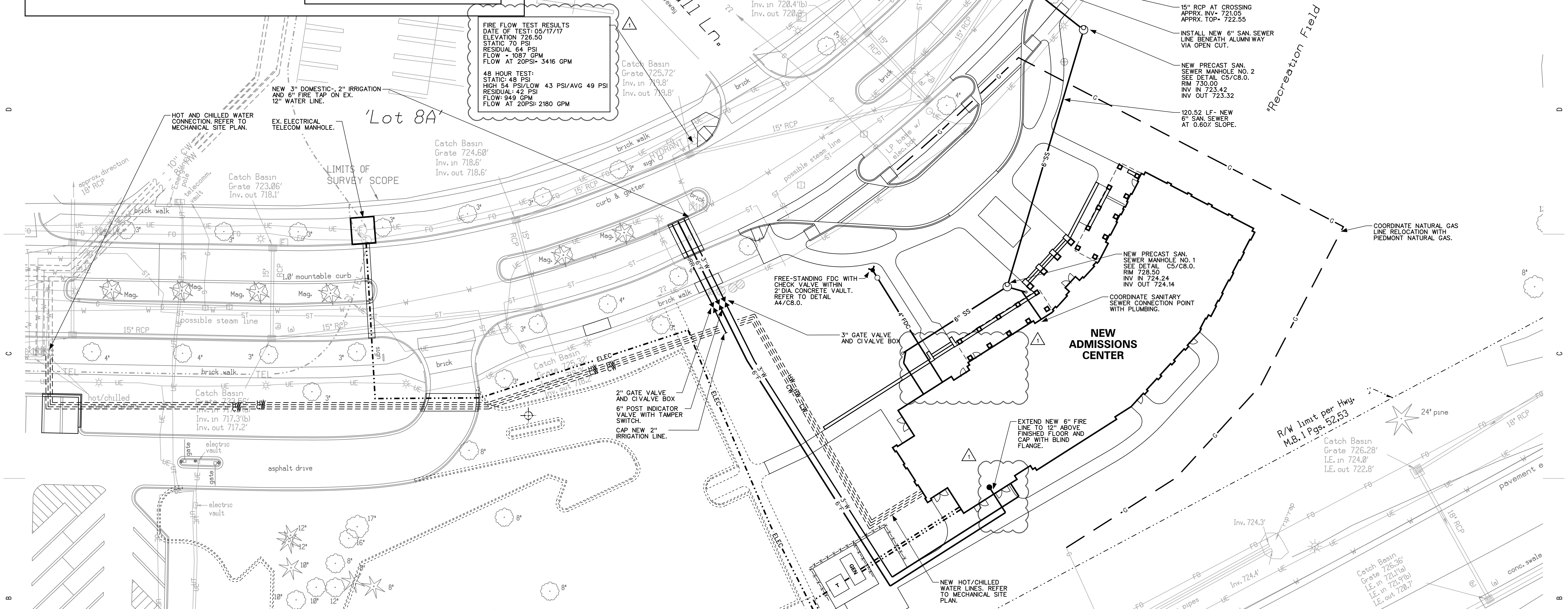
FIRE FLOW ANALYSIS

FIRE FLOW SUMMARY

	Label	Elevation (ft)	Pressure (psi)	Flow (Total Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
39: Bldg Riser	Bldg Riser	728.33	69.1	520	1,951	20.0	20.0	J-9	☑
38: J-9	J-9	727.33	69.5	0	1,994	20.0	20.0	Bldg Riser	☑
42: J-13	J-13	727.33	69.5	0	427	20.0	20.2	Dom. Connection	☑
43: Dom. Co...	Dom. Connection	727.33	69.5	0	421	20.0	20.2	J-13	☑
30: J-1	J-1	726.50	69.9	3,000	3,415	20.0	20.0	Bldg Riser	☑
31: J-2	J-2	726.50	69.9	0	3,335	20.0	20.0	Bldg Riser	☑
36: J-7	J-7	726.50	69.9	0	3,333	20.0	20.0	Bldg Riser	☑
40: J-11	J-11	726.50	69.9	0	3,332	20.0	20.0	Bldg Riser	☑
37: J-8	J-8	726.00	70.1	0	2,201	20.0	20.0	Bldg Riser	☑
41: J-12	J-12	726.00	70.1	0	495	20.0	20.1	Dom. Connection	☑

NETWORK SCHEMATIC





GENERAL NOTES:

1. CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO THE BEGINNING OF DEMOLITION AND/OR CONSTRUCTION. CONTACT UNC CHARLOTTE FACILITIES MANAGEMENT FOR UTILITY LOCATES AT LEAST THREE DAYS PRIOR TO ANY DIGGING.

2. PROTECT ALL EXISTING UTILITIES TO REMAIN DURING ALL CONSTRUCTION ACTIVITIES.

3. THERE SHALL BE A MINIMUM OF 10 FT. SEPARATION BETWEEN THE SEWER LINE AND THE WATER MAIN. WHEN THE 10 FT MINIMUM LATERAL SEPARATION CANNOT BE MAINTAINED AND WHEN THE WATER MAIN IS ABOVE THE SEWER, BUT LESS THAN 18" CLEARANCE, OR WHEN THE SEWER IS ABOVE THE WATER MAIN, BOTH THE WATER MAIN AND SEWER LINE SHALL BE CONSTRUCTED OF FERROUS MATERIALS WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS FOR A MINIMUM LATERAL DISTANCE, MEASURED AT RIGHT ANGLES TO THE SEWER, OF 10 FT ON EACH SIDE OF THE CROSSING.

4. A 12" VERTICAL SEPARATION SHALL BE PROVIDED BETWEEN STORM SEWER AND SANITARY SEWER LINES OR BOTH LINES SHALL BE CONSTRUCTED OF FERROUS MATERIALS FOR A MINIMUM LATERAL DISTANCE OF 10 FT. ON EACH SIDE OF THE CROSSING.

5. ALL SANITARY SEWER LATERALS SHALL MAINTAIN A MIN. COVER OF 24" WITH CLEANOUTS AT 75' MAX. SPACING. 4" LATERAL MIN. SLOPE = 2.0%. 6" LATERAL MIN. SLOPE = 1.0%. CLEANOUTS IN PAVED AREAS SHALL BE TRAFFIC BEARING CLEANOUTS. REFER TO DETAIL A5/C7.03 FOR CLEANOUTS.

6. ALL SANITARY SEWER PIPE SHALL BE BEDDED IN ACCORDANCE WITH DETAIL A1/C7.04.

7. ALL DOMESTIC AND FIRE LINES SHALL HAVE RESTRAINED JOINTS.

8. ALL BENDS AND INTERSECTIONS IN WATER LINES SHALL HAVE CONCRETE BLOCKING IN ACCORDANCE WITH DETAIL A2/C7.03.

9. THERE SHALL BE NO TAPS, PIPING, BRANCHES, UNAPPROVED BYPASS PIPING, HYDRANTS, FIRE DEPARTMENT CONNECTION POINTS, OR OTHER WATER-USINGAPPURTENANCES CONNECTED TO THE SUPPLY LINE BETWEEN THE WATER MAIN AND THE SUPPLY LINE BACKFLOW PREVENTER UNLESS SUCH CONNECTION LEADS DIRECTLY TO ANOTHER BACKFLOW PREVENTER.

10. RIM ELEVATIONS GIVEN ON THESE PLANS ARE APPROXIMATE AND ARE FOR INFORMATIONAL PURPOSES ONLY. ACTUAL RIM ELEVATIONS SHALL BE ADJUSTED BY CONTRACTOR TO MATCH FIELD CONDITIONS. THE TOP 12" OF ALL NEW CONCRETE STRUCTURES SHALL BE BRICK CONSTRUCTION OROBTAINED WITH PRECAST GRADE RINGS TO ALLOW FOR ADJUSTMENT AS NECESSARY. STRUCTURES SHALL BE ADJUSTABLE +/- 12" FROM THE RIM ELEVATION PROVIDED AT NO ADDITIONAL COST TO THE OWNER. THE FIELD ADJUSTMENTS SHALL ENSURE THAT ALL MANHOLE LIDS ARE FLUSH WITH THE FINISHED SURFACE. MANHOLE RIMS TO BE SET ABOVE FINISHED GRADE WILL BE NOTED ON PLANS.

11. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CHARLOTTE MECKLENBURG UTILITY DEPARTMENT STANDARD SPECIFICATIONS AND ALL OTHER CITY, STATE, AND FEDERAL REGULATIONS AND/OR STANDARDS. WHEN SPECIFICATIONS ARE IN CONFLICT, THE STRICTER SPECIFICATION SHALL BE HELD.

12. ALL LANE CLOSURES THAT ARE REQUIRED SHALL FOLLOW THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS FOR TRAFFIC CONTROL MEASURES.

13. ALL SHORING SHALL BE IN ACCORDANCE WITH OSHA TRENCHING STANDARDS, PART 1926 SUB-PART P, AS AMENDED.

14. CONTRACTORS SHALL NOTIFY AND COOPERATE WITH ALL UTILITY COMPANIES OR FIRMS HAVING FACILITIES ON OR ADJACENT TO THE WORK SITE BEFORE DISTURBING, ALTERING, REMOVING, RELOCATING, ADJUSTING OR CONNECTING TO SAID FACILITIES. CONTRACTORS SHALL RAISE OR LOWER TOPS OF EXISTING MANHOLES OR DRAINAGE GRATES AS REQUIRED TO MATCH FINISHED GRADES.

15. ALL LINEAR FOOTAGE OF ALL UTILITY PIPES SHOWN ARE APPROXIMATE. ACTUAL INSTALLED QUANTITIES MAY VARY. PIPE LENGTHS PROVIDED ARE HORIZONTAL MEASUREMENTS FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.

16. CONTRACTOR TO COORDINATE ALL WORK WITH OTHER UTILITY INSTALLATIONS NOT COVERED IN THESE PLANS (ELECTRIC, TELEPHONE, GAS, CABLE, ETC.) AND ALLOW FOR THEIR OPERATIONS AND CONSTRUCTION TO BE PERFORMED. ALL PLANNED ROUTING AND UTILITY DEPTHS SHALL BE COORDINATED PRIOR TO ANY INSTALLATIONS.

17. ALL NEW UNDERGROUND UTILITY LINES INCLUDING LAWN IRRIGATION LINES, THAT ARE LOCATED OUTSIDE OF THE BUILDING FOOTPRINT ARE REQUIRED TO HAVE A CONTIINUOUS WARNING TAPE INSTALLED IN THE BACKFILL DIRECTLY OVER THE UTILITY LINE 6" TO 24" BELOW FINISHED GRADE AND 6" BELOW SUBGRADE UNDER PAVEMENT SECTIONS. REFER TO SPECIFICATIONS DIVISION 31 FOR WARNING TAPE REQUIREMENTS.

BOTH METALIC AND NON-METALIC PIPES, OTHER THAN GAS LINES, SHALL BE IDENTIFIED BY DETECTABLE MAGNETIC TYPE WARNING TAPE, MIN. 2" WIDE, WITH LETTERING TO IDENTIFY BURIED LINE BELOW.

FOR PLASTIC SEWER PIPING, AN INSULATED COPPER TRACER WIRE OR OTHER APPROVED CONDUCTOR SHALL BE INSTALLED ADJACENT TO AND OVER THE FULL LENGTH OF THE PIPING. ACCESS SHALL BE PROVIDED TO THE TRACER WIRE OR THE TRACER WIRE SHALL TERMINATE AT THE CLEANOUT BETWEEN THE BUILDING DRAIN AND BUILDING SEWER. THE TRACER WIRE SIZE SHALL BE NOT LESS THAN 14AWG AND THE INSULATION TYPE SHALL BE LISTED FOR DIRECT BURIAL.

2009 NC GAS CODE, SECTION 404.14.3 TRACER: AN INSULATED COPPER TRACER WIRE (14 GAUGE) OR OTHER APPROVED CONDUCTOR SHALL BE INSTALLED ADJACENT TO UNDERGROUND NON-METALLIC PIPING. ACCESS SHALL BE PROVIDED TO THE TRACER WIRE OR THE TRACER WIRE SHALL TERMINATE ABOVE GROUND AT THE END OF THE NON-METALLIC PIPING. THE TRACER WIRE SIZE SHALL NOT BE LESS THAN 18AWG AND THE INSULATION TYPE SUITABLE FOR DIRECT BURIAL.

18. CONTRACTOR SHALL MAINTAIN ALL WATER AND FIRE SERVICE TO EXISTING BUILDINGS DURING THE CONSTRUCTION OF THE NEW WATER MAIN. COORD. DEMOLITION OF THE EXISTING WATER-MAIN WITH THE NEW CONSTRUCTION. COORDINATE NEW CONNECTIONS AND ANY PLANNED TEMPORARY SERVICE INTERRUPTION WITH THE UNIVERSITY.

19. ALL NEW WATER VALVES SHALL BE CLOCKWISE TO CLOSE. ALL VALVE BOXES WITHIN YARD AREAS SHALL BE FLUSH WITH FINISHED GRADE AND PROTECTED WITH A PRECAST CONCRETE DONUT.

20. ALL UNDERGROUND UTILITIES, INCLUDING IRRIGATION AND METALIC PIPE SHALL HAVE TRACER WIRE INSTALLED CONTINUOUSLY ALONG THE TOP OF THE PIPE TAPED AT 10' MAXIMUM INTERVALS. TRACER WIRE SHALL BE BROUGHT UP AT ALL VAULTS, MANHOLES, VALVE BOXES, FIRE HYDRANTS, FREE STANDING FDC'S, ETC. REFER TO DETAIL D1/C800.

1" = 20' - 0"

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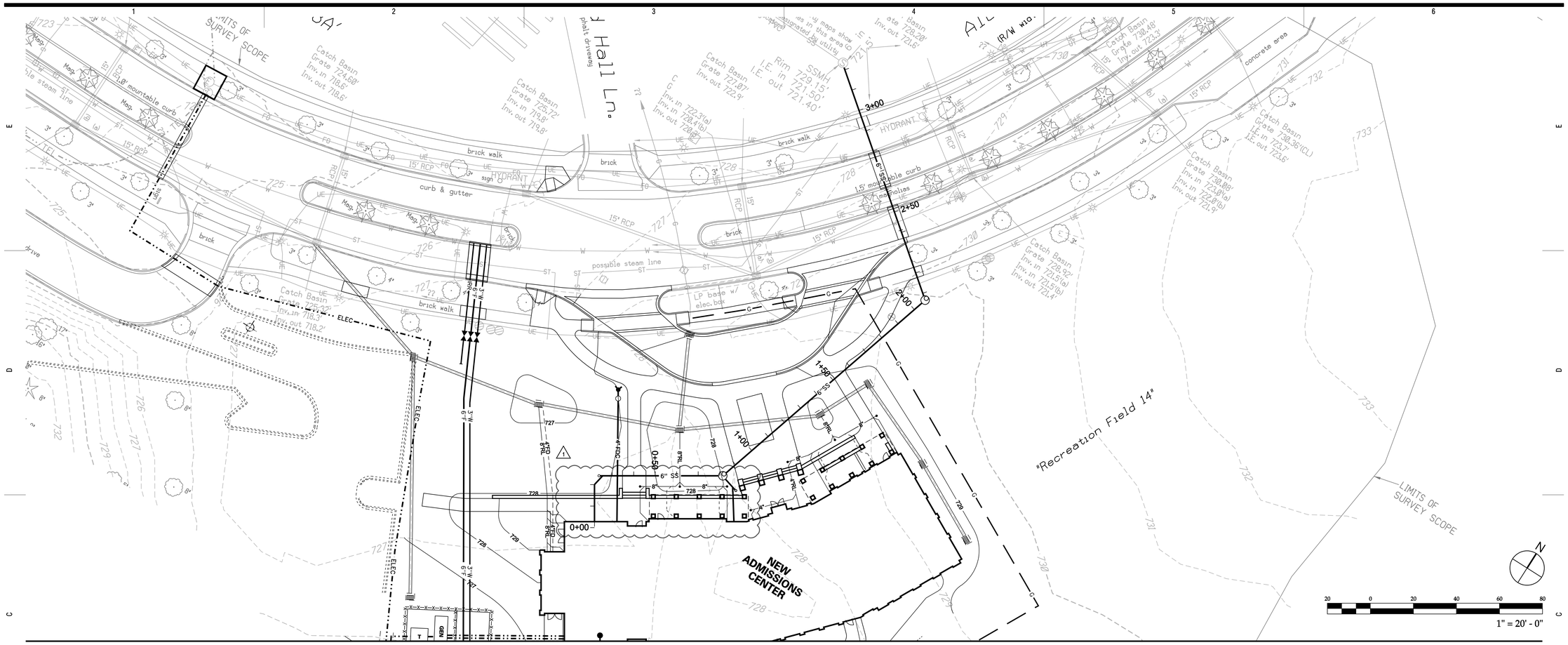
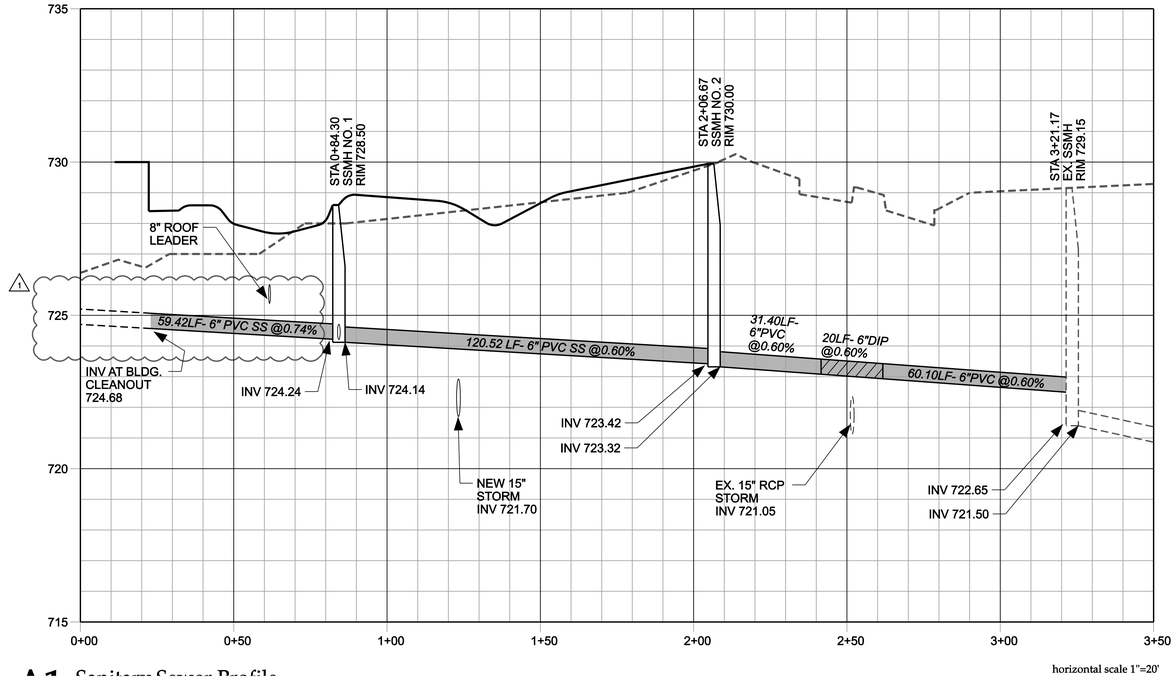
UTILITY PLAN

WTS PROJECT NO.	SHEET
1604	C4.0





A-1 Sanitary Sewer Profile

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SANITARY SEWER PLAN AND PROFILE

1604 WTS PROJECT NO.

C4.1 SHEET

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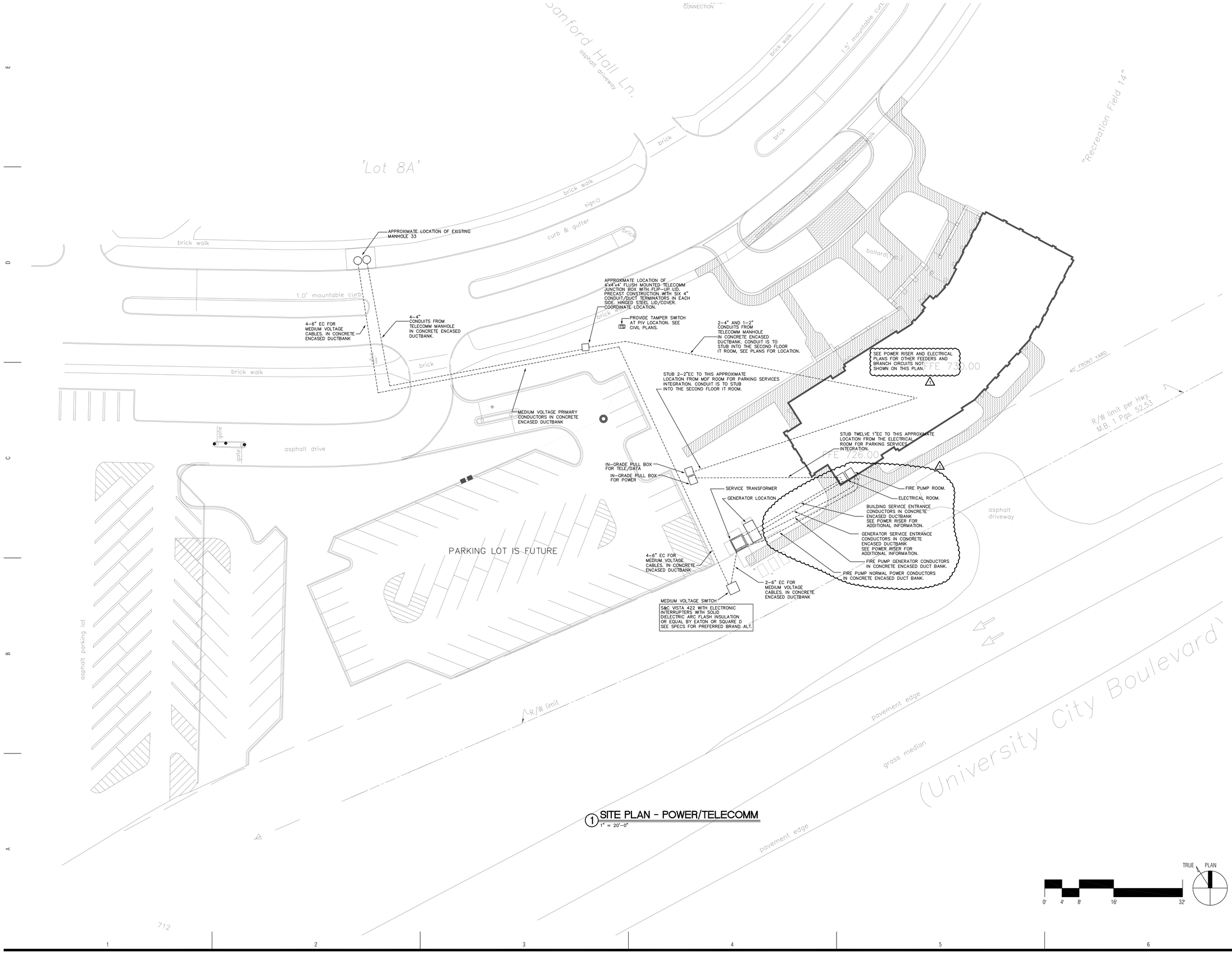

1 SITE PLAN - POWER/TELECOMM
1" = 20'-0"

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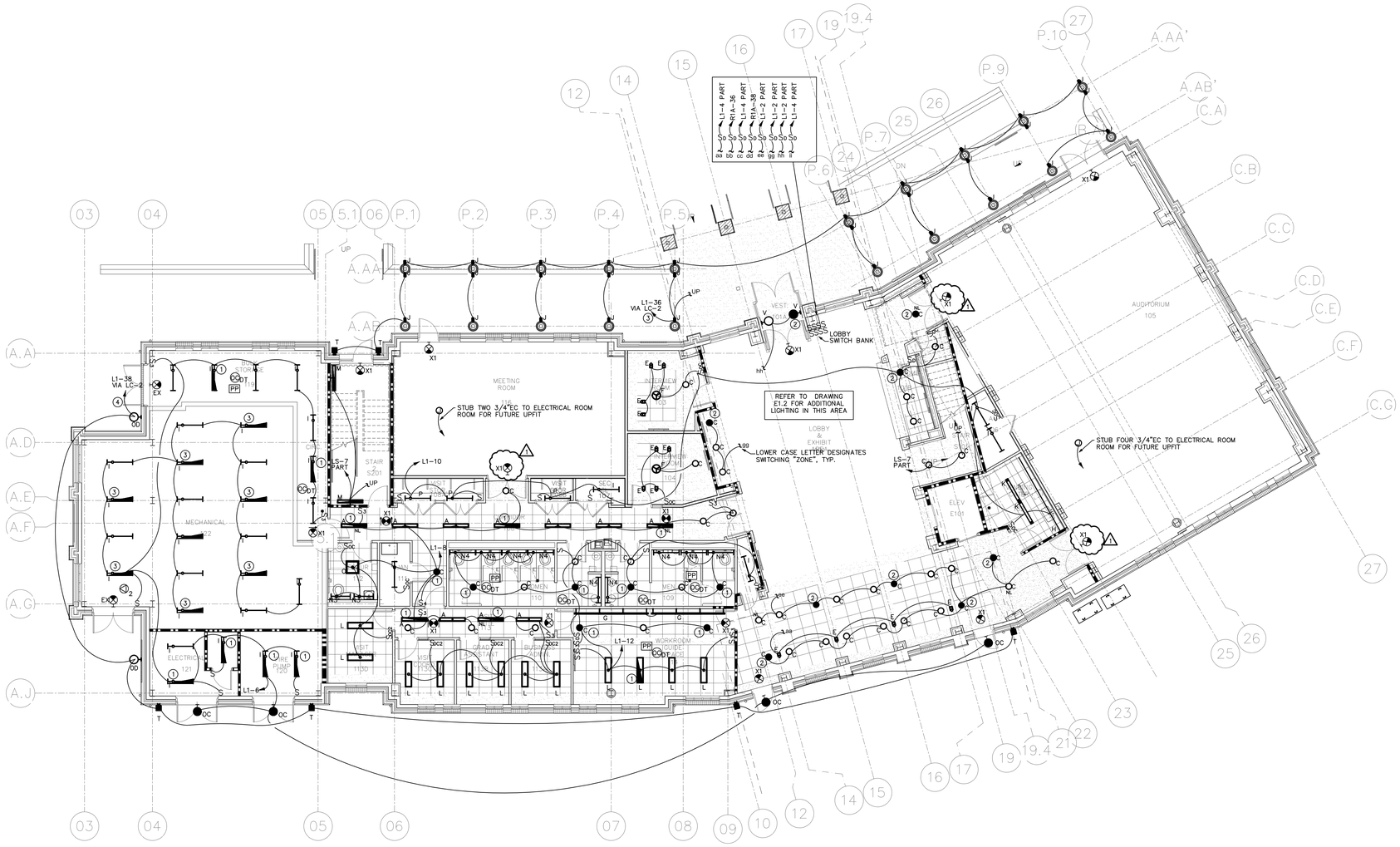
SITE PLAN - POWER -

1604 — WTS PROJECT NO.
E0.2 — SHEET



1 FIRST FLOOR PLAN - LIGHTING

1/8" = 1'-0" (BASE BID-SHELL)

KEYED NOTES

1. PROVIDE BODINE GTD TRANSFER DEVICE. CONNECT TO LIFE SAFETY CIRCUIT LS-1.
2. PROVIDE BODINE GTD TRANSFER DEVICE. CONNECT TO LIFE SAFETY CIRCUIT LS-2.
3. CONNECT TO SINGLE BODINE GT20A TRANSFER DEVICE FOR GROUP OF FIXTURES NOTED. CONNECT TO LIFE SAFETY CIRCUIT LS-6.
4. CONNECT TO SINGLE BODINE GT20A TRANSFER DEVICE FOR GROUP OF FIXTURES NOTED. CONNECT TO LIFE SAFETY CIRCUIT LS-8.

GENERAL NOTES

1. LIGHTING CIRCUIT WIRING SHOWN IS DIAGRAMMATICAL ONLY. PROVIDE NECESSARY LOW VOLTAGE AND LINE VOLTAGE WIRING BETWEEN CONTROLS, POWER PACKS, AND OCCUPANCY SENSORS.
2. 'NL' DENOTES NIGHT LIGHT. CONNECT AHEAD OF LOCAL SWITCHING. SHALL REMAIN ON AT ALL TIMES.
3. REFER TO ARCHITECTURAL PLANS FOR AIMING OF WALL WASH FIXTURES.
4. CONNECT EXIT SIGNS TO THE NEAREST LIFE SAFETY CIRCUIT AHEAD OF SWITCHING.

RATED WALL LEGEND

1 HOUR FIRE BARRIER

REFER TO ARCHITECTURAL DRAWINGS FOR COMPLETE WALL CONSTRUCTION AND RATING INFORMATION.

TRUE PLAN

0' 4' 8' 16' 32'

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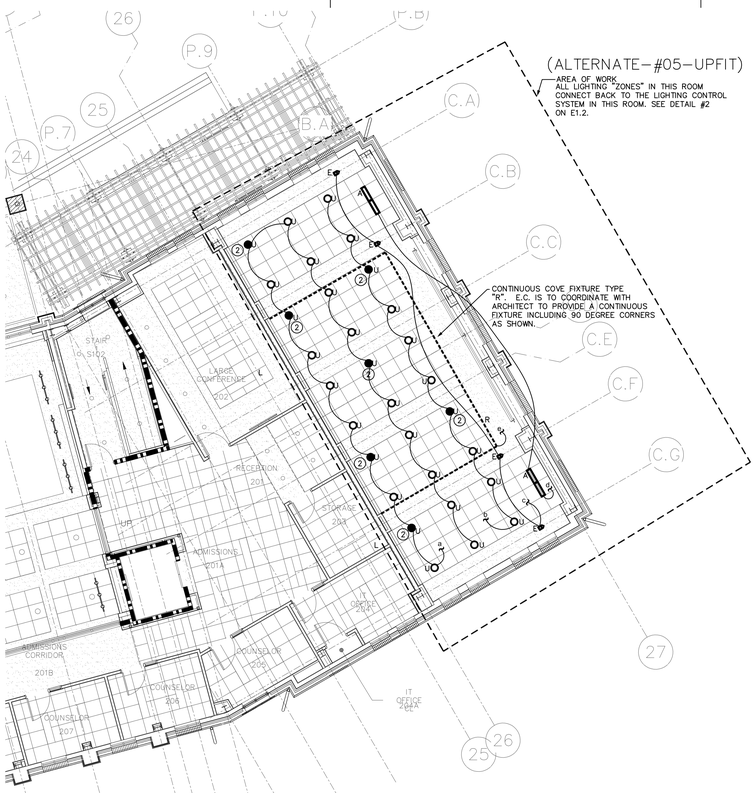
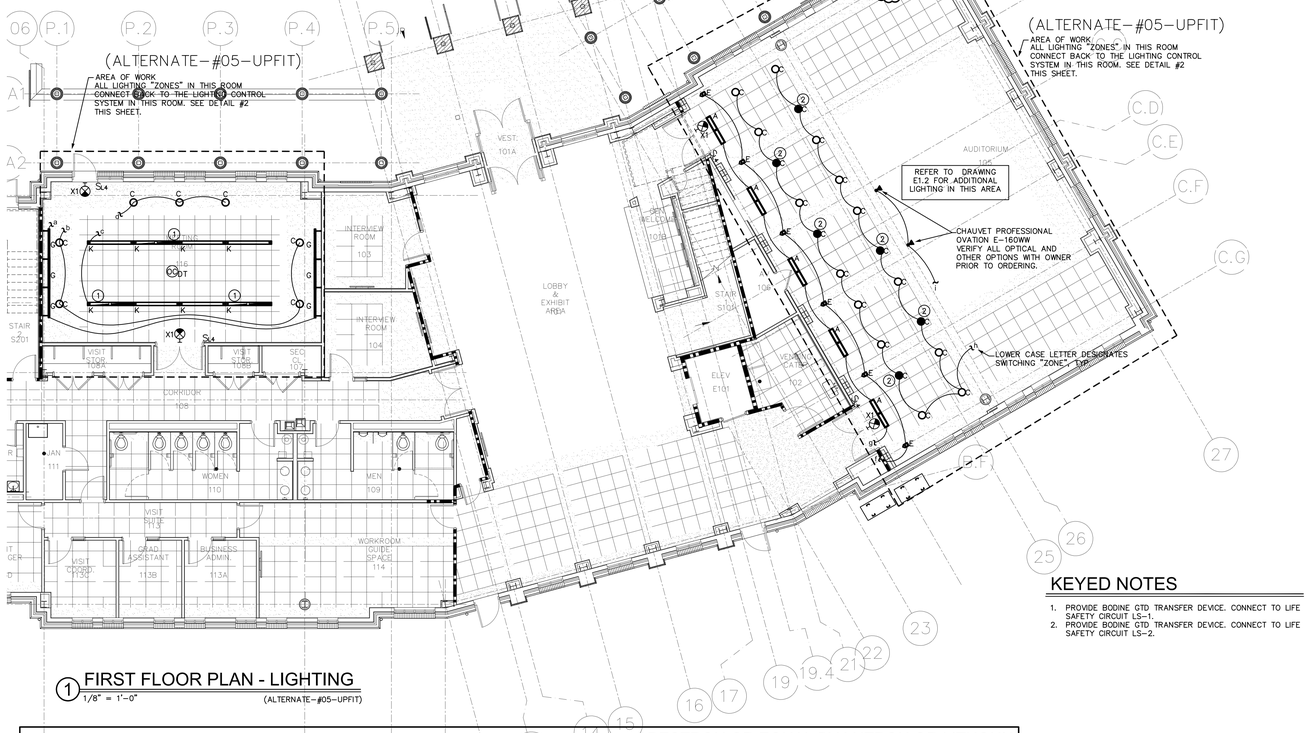
FIRST FLOOR
PLAN - LIGHTING

1604 WTS PROJECT NO.

E1.1 SHEET



3 SECOND FLOOR PLAN - LIGHTING
1/8" = 1'-0" (ALTERNATE–#05–UPFIT)

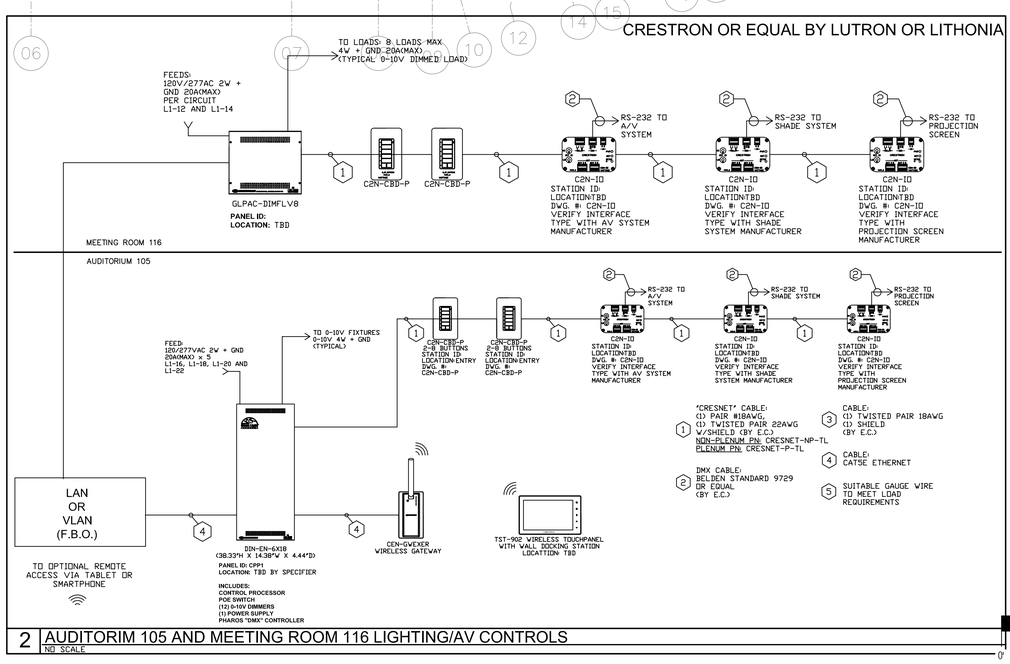


1 FIRST FLOOR PLAN - LIGHTING
1/8" = 1'-0" (ALTERNATE–#05–UPFIT)

KEYED NOTES

1. PROVIDE BODINE GTD TRANSFER DEVICE. CONNECT TO LIFE SAFETY CIRCUIT LS–1.
2. PROVIDE BODINE GTD TRANSFER DEVICE. CONNECT TO LIFE SAFETY CIRCUIT LS–2.

CRESTRON OR EQUAL BY LUTRON OR LITHONIA



2 AUDITORIM 105 AND MEETING ROOM 116 LIGHTING/AV CONTROLS
NO SCALE

RATED WALL LEGEND

1 HOUR FIRE BARRIER

REFER TO ARCHITECTURAL DRAWINGS FOR COMPLETE WALL CONSTRUCTION AND RATING INFORMATION.

TRUE PLAN

0' 4' 8' 16' 32'

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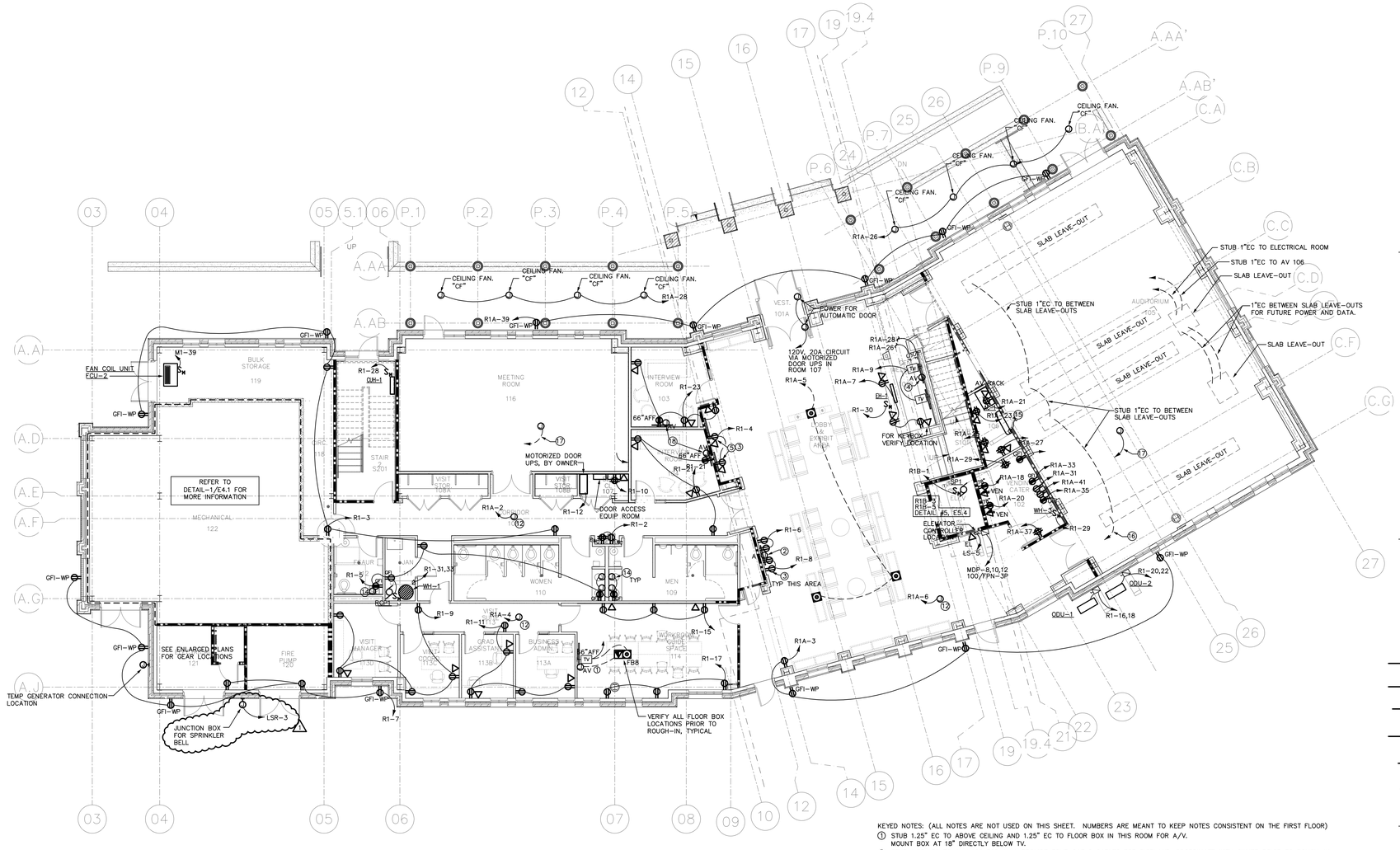
FLOOR PLAN - LIGHTING

1604 WTS PROJECT NO.

E1.3 SHEET

8 OF 26
OPTIMA #: 15-0056



1 FIRST FLOOR PLAN - POWER

1/8" = 1'-0" (BASE BID-SHELL)

KEYED NOTES: (ALL NOTES ARE NOT USED ON THIS SHEET. NUMBERS ARE MEANT TO KEEP NOTES CONSISTENT ON THE FIRST FLOOR)

1. STUB 1.25" EC TO ABOVE CEILING AND 1.25" EC TO FLOOR BOX IN THIS ROOM FOR A/V. MOUNT BOX AT 18" DIRECTLY BELOW TV.
2. STUB 1.25" EC TO A/V 106 FOR A/V. PROVIDE FOUR CAT 6 CABLES FOR DISPLAYS, COORDINATE WITH OWNER PRIOR TO ROUGH-IN.
3. SEE ARCHITECTURAL ELEVATIONS PRIOR TO ROUGH-IN.
4. TWO 1.25" EC TO A/V 106 FOR A/V. COORDINATE WITH OWNER PRIOR TO ROUGH-IN.
5. POWER AND DATA FOR TOUCH-SCREEN MONITORS.
6. JUNCTION BOX FOR WALL MOUNTED SPEAKER (BY OTHERS). STUB 1.25" EC TO A/V 106 FOR A/V.
7. IN FLOOR, FLUSH MOUNTED JUNCTION BOX FOR SEAT LIGHTING (PROVIDED BY OTHERS) COORDINATE LOCATIONS WITH SEATING SUBMITTALS PRIOR TO ROUGH-IN.
8. STUB TWO 1.25"EC FROM THIS FLOOR BOX LOCATION TO A/V 106 FOR A/V.
9. PROVIDE RECEPTACLE AND 1.25" EC TO A/V 106 FOR LEDGE MOUNTED PROJECTOR FOR A/V. SEE ARCHITECTURAL PLANS
10. PROVIDE RECEPTACLE AND 1.25" EC TO A/V 106 FOR PROMPTER SCREEN.
11. STUB TWO 1.25" EC TO ABOVE CEILING FOR A/V
12. PROVIDE 120V CIRCUIT FOR MECHANICAL CONTROLS, SEE PLANS FOR CIRCUIT INFORMATION.
13. MOTORIZED SHADES IN THIS LOCATION ARE AT TWO LEVELS, PROVIDE JUNCTION BOXES AT EACH LEVEL AND CONNECT TO CIRCUIT SHOWN.
14. PROVIDE JUNCTION BOX BELOW COUNTER FOR HARDWIRED FAUCET, SEE PLUMBING PLANS FOR NUMBER OF FAUCETS IN EACH LOCATION.
15. THIS INDOOR UNIT IS TO BE POWERED FROM THE RESPECTIVE OUTDOOR UNIT. THE E.C. IS TO PROVIDE CONDUCTORS BETWEEN THE INDOOR AND OUTDOOR AND INSTALL PER MANUFACTURERS RECOMMENDATIONS.
16. STUB 1.25"EC TO ELECTRICAL ROOM AND 1.25"EC TO AV 106 FOR A/V
17. STUB SIX 1.25"EC TO ELECTRICAL ROOM FOR FUTURE UPFIT
18. STUB ONE 1.25" EC TO ABOVE CEILING FOR A/V.

GENERAL NOTES:

1. COORDINATE LOCATIONS OF ALL OWNER PROVIDED EQUIPMENT IN A/V 106 AND STUB UP LOCATION OF ASSOCATED CONDUIT WITH OWNER PRIOR TO ROUGH-IN.
2. ALL UNDER/IN-SLAB CONDUIT IN AUDITORIUM 105 IS TO BE METALLIC, PVC IS NOT ALLOWED.
3. MOTORIZED SHADES AND MOTORIZED SCREEN ARE TO BE CONTROLLED AT THE PODIUM. E.C. IS TO CONNECT COMPLETE. COORDINATE WITH OWNER PRIOR TO ROUGH-IN.
4. A/V EQUIPMENT, MOTORIZED SHADES AND MOTORIZED SCREEN IN THE MEETING ROOM ARE TO BE CONTROLLED AT THE PODIUM. E.C. IS TO CONNECT COMPLETE COORDINATE WITH OWNER PRIOR TO ROUGH-IN. PROVIDE ADDITIONAL RACEWAYS AS REQUIRED FOR CONTROLS.
5. A/V EQUIPMENT, MOTORIZED SHADES, MOTORIZED SCREEN AND SEAT LIGHTING IN THE AUDITORIUM ARE TO BE CONTROLLED VIA TOUCHSCREEN. E.C. IS TO CONNECT COMPLETE COORDINATE WITH OWNER PRIOR TO ROUGH-IN. PROVIDE ADDITIONAL RACEWAYS AS REQUIRED FOR CONTROLS.
6. ALL ACCESS CONTROL (CARD READERS, PUSH BUTTONS, ETC) ARE TO BE MOUNTED AT 36"AFF TO CENTER OF THE DEVICE.

RATED WALL LEGEND

1 HOUR FIRE BARRIER

REFER TO ARCHITECTURAL DRAWINGS FOR COMPLETE WALL CONSTRUCTION AND RATING INFORMATION.

TRUE PLAN

0' 4' 8' 16' 32'

ARCHITECTURE
INTERIORS
PLANNING

WTS
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UNC CHARLOTTE

NORTH CAROLINA PROFESSIONAL SEAL 028297 ENGINEER BRANDON L. MILLER
08.24.2017

ISSUE DATE:	AUGUST 24, 2017
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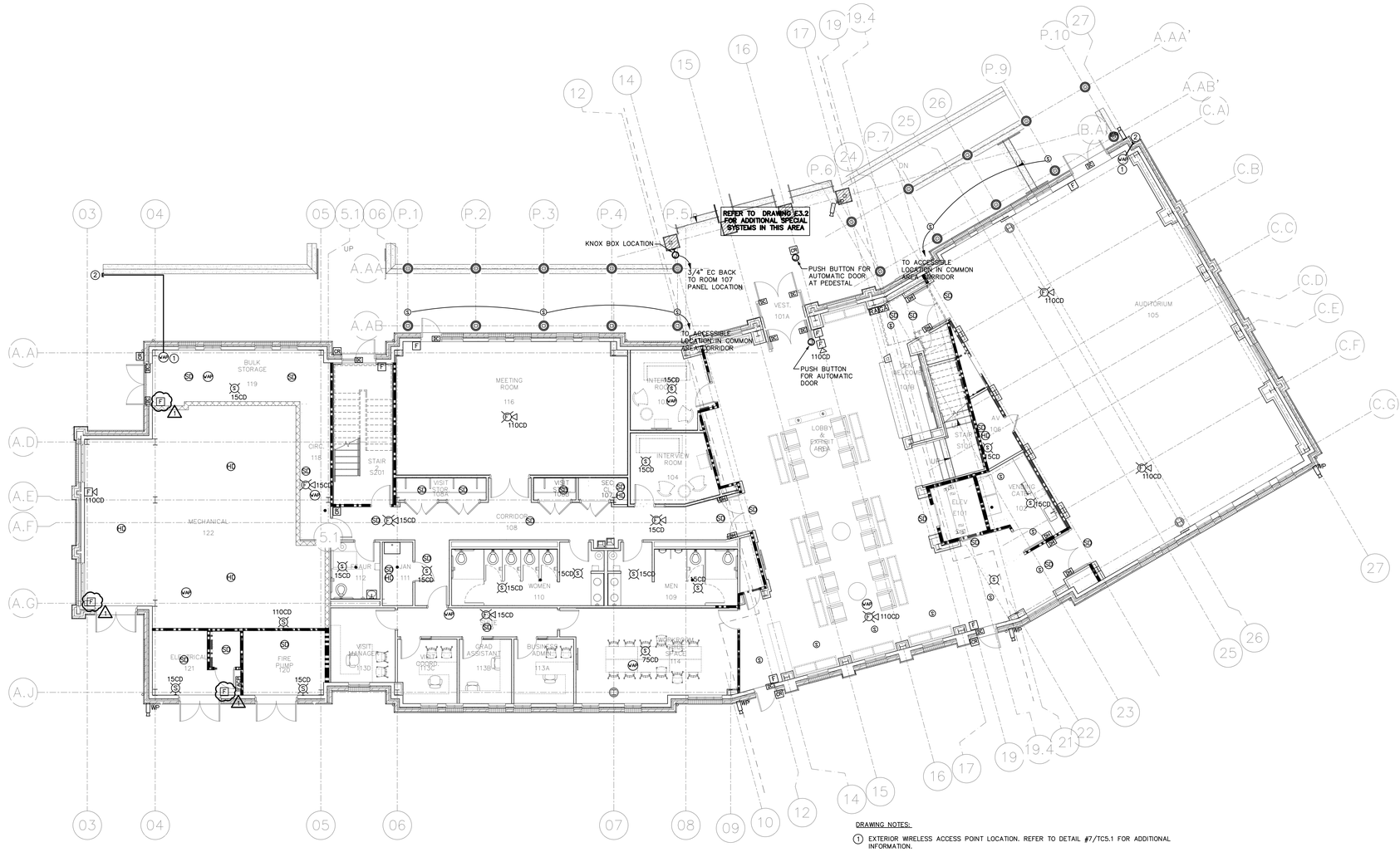
#	DATE	REVISION
1	09.13.2017	ADDENDUM 02

FIRST FLOOR
PLAN - POWER

1604 WTS PROJECT NO.

E2.1 SHEET



DRAWING NOTES:

1. EXTERIOR WIRELESS ACCESS POINT LOCATION. REFER TO DETAIL #7/TC5.1 FOR ADDITIONAL INFORMATION.
2. PROVIDE 1" CONDUIT FROM INTERIOR LOCATION AS INDICATED FOR WIRELESS ACCESS POINT. ROUTE CONDUIT CONCEALED.

1 FIRST FLOOR - SPECIAL SYSTEMS

1/8" = 1'-0" (BASE BID-SHELL)

RATED WALL LEGEND

1 HOUR FIRE BARRIER

REFER TO ARCHITECTURAL DRAWINGS FOR COMPLETE WALL CONSTRUCTION AND RATING INFORMATION.

0' 4' 8' 16' 32'

TRUE PLAN

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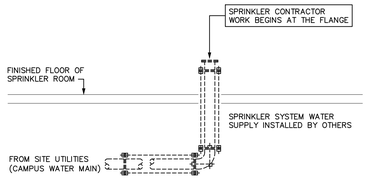
1	09.13.2017	ADDENDUM 02

FIRST FLOOR
PLAN - SPECIAL
SYSTEMS

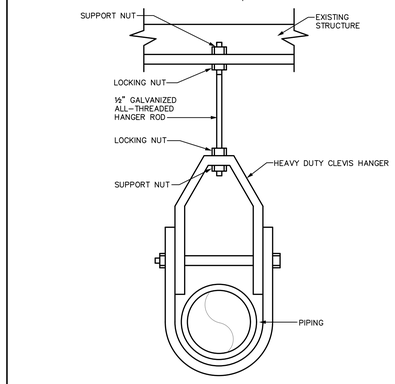
1604 WTS PROJECT NO.

E3.1 SHEET

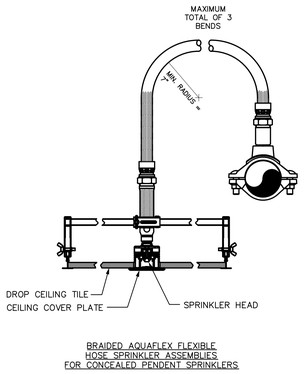
12 OF 26
OPTIMA #: 16-0056



1 FIRE SERVICE ENTRY DETAIL
NO SCALE



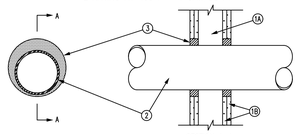
2 PIPE HANGER DETAIL
NO SCALE



BRAIDED AQUAFLEX FLEXIBLE
HOSE SPRINKLER ASSEMBLIES
FOR CONCEALED PENDENT SPRINKLERS

3 TYPICAL FLEX RETURN BEND SCHEMATIC
NO SCALE

System No. W-L-1054
December 04, 2002
F RATINGS – 1 AND 2 HR (SEE ITEMS 1 AND 3)
T RATING – 0 HR
L RATING AT AMBIENT – LESS THAN 1 CFM/SQ FT
L RATING AT 400 F – 4 CFM/SQ FT



SECTION A–A

1. WALL ASSEMBLY – THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

A. STUDS – WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2–1/2 IN. WIDE AND SPACED MAX 24 IN. OC. WHEN STEEL STUDS ARE USED AND THE DIAM OF OPENING EXCEEDS THE WIDTH OF STUD CAVITY, THE OPENING SHALL BE FRAMED ON ALL SIDES USING LENGTHS OF STEEL STUD INSTALLED BETWEEN THE VERTICAL STUDS AND SCREW-ATTACHED TO THE STEEL STUDS AT EACH END. THE FRAMED OPENING IN THE WALL SHALL BE 4 TO 6 IN. WIDER AND 4 TO 6 IN. HIGHER THAN THE DIAM OF THE PENETRATING ITEM SUCH THAT, WHEN THE PENETRATING ITEM IS INSTALLED IN THE OPENING, A 2 TO 3 IN. CLEARANCE IS PRESENT BETWEEN THE PENETRATING ITEM AND THE FRAMING ON ALL FOUR SIDES.

B. GYPSUM BOARD* – 5/8 IN. THICK, 4 FT WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 32–1/4 IN. FOR STEEL STUD WALLS. MAX DIAM OF OPENING IS 14–1/2 IN. FOR WOOD STUD WALLS.

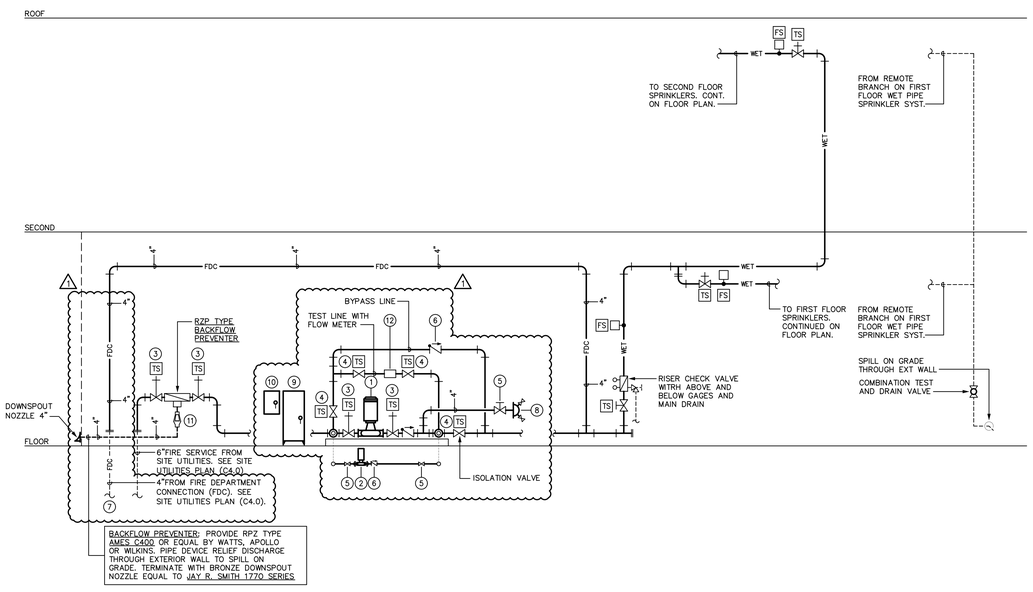
THE F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE FIRE RATING OF THE WALL ASSEMBLY.

2. THROUGH-PENETRANTS – ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE SHALL BE MIN 0 IN. TO MAX 2–1/4 IN. PIPE MAY BE INSTALLED WITH CONTINUOUS POINT CONTACT. PIPE, CONDUIT OR TUBING MAY BE INSTALLED AT AN ANGLE NOT GREATER THAN 45 DEGREES FROM PERPENDICULAR. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

A. STEEL PIPE – NOM 30 IN DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE – NOM 30 IN. DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT – NOM 4 IN DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. DIAM STEEL CONDUIT.
D. COPPER TUBING – NOM 6 IN. DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
E. COPPER PIPE – NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

3. FILL, VOID OR CAVITY MATERIAL* – SEALANT – MIN 5/8 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. AT THE POINT OR CONTINUOUS CONTACT LOCATIONS BETWEEN PIPE AND WALL, A MIN 1/2 IN. DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE PIPE WALL INTERFACE ON BOTH SURFACES OF WALL.

4 U.L SYSTEM NO W-L-1054 DETAIL
NO SCALE



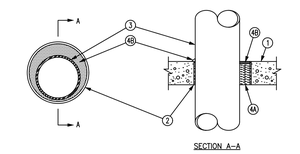
KEY

1. ELECTRIC DRIVEN FIRE PUMP 500 GPM @ 104 FT (45 PSI)
2. JOCKEY PUMP
3. O.S.&Y. GATE VALVE WITH TAMPER SWITCH
4. INDICATING SHUT-OFF VALVE WITH TAMPER SWITCH
5. INDICATING SHUT-OFF VALVE
6. SWING CHECK VALVE
7. FIRE DEPARTMENT CONNECTION
8. FIRE PUMP TEST HEADER
9. FIRE PUMP CONTROLLER WITH ATS
10. JOCKEY PUMP CONTROLLER
11. AIR GAP FITTING; JAY R SMITH 3951 SERIES
12. FLOW METER

BACKFLOW PREVENTER: PROVIDE RPZ TYPE AMES C400 OR EQUAL BY WATTS, APOLLO OR WILKINS. PIPE DEVICE RELIEF DISCHARGE THROUGH EXTERIOR WALL TO SPILL ON GRADE. TERMINATE WITH BRONZE DOWNSPOUT NOZZLE EQUAL TO JAY R. SMITH 1770 SERIES.

5 FIRE SUPPRESSION SYSTEM SCHEMATIC DIAGRAM (INCLUDES ALTERNATE 11 - FIRE PUMP)
NO SCALE

System No. C-AJ-1155
September 26, 2000
F RATING – 3 HR
T RATING – 0 HR
L RATING AT AMBIENT – LESS THAN 1 CFM/SQ FT
L RATING AT 400 F – 4 CFM/SQ FT



SECTION A–A

1. FLOOR OR WALL ASSEMBLY – MIN 4–1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100–150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAM OF OPENING IS 26 IN. SEE CONCRETE BLOCKS (CAZT) CATEGORY IN FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

2. METALLIC SLEEVE (OPTIONAL) – NOM 24 IN. DIAM (OR SMALLER) SCHEDULE 40 (OR HEAVIER) STEEL PIPE CAST OR GROUTED INTO FLOOR OR WALL ASSEMBLY, FLUSH WITH FLOOR OR WALL ASSEMBLY.

3. THROUGH PENETRANTS – ONE METALLIC PIPE OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE ANNULAR SPACE SHALL BE MIN 0 IN.(POINT CONTACT) TO MAX 2–1/4 IN. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES OR TUBING MAY BE USED:

A. STEEL PIPE – NOM 20 IN. DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE – NOM 20 IN. DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT – NOM 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR NOM 6 IN. DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR NOM 6 IN. DIAM (OR SMALLER) STEEL CONDUIT.
D. COPPER TUBING – NOM 6 IN. DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
E. COPPER PIPE – NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE

4. FIRESTOP SYSTEM – THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:

A. PACKING MATERIAL – MIN 4 IN. THICKNESS OF MIN 4.0 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM TOP END OF SLEEVE FOR FLOORS OR FROM BOTH ENDS OF SLEEVE FOR WALLS AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.

B. FILL, VOID OR CAVITY MATERIAL* – SEALANT – MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH THE TOP END OF THE SLEEVE FOR FLOORS, OR WITH BOTH ENDS OF THE SLEEVE FOR WALLS. MIN 1/2 IN. THICK BEAD OF ALL MATERIAL TO BE INSTALLED AROUND PIPE AT INTERFACE OF SLEEVE FOR POINT CONTACT INSTALLATIONS.

6 U.L SYSTEM NO C-AJ-1155 DETAIL
NO SCALE

ARCHITECTURE
INTERIORS
PLANNING

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UNC CHARLOTTE

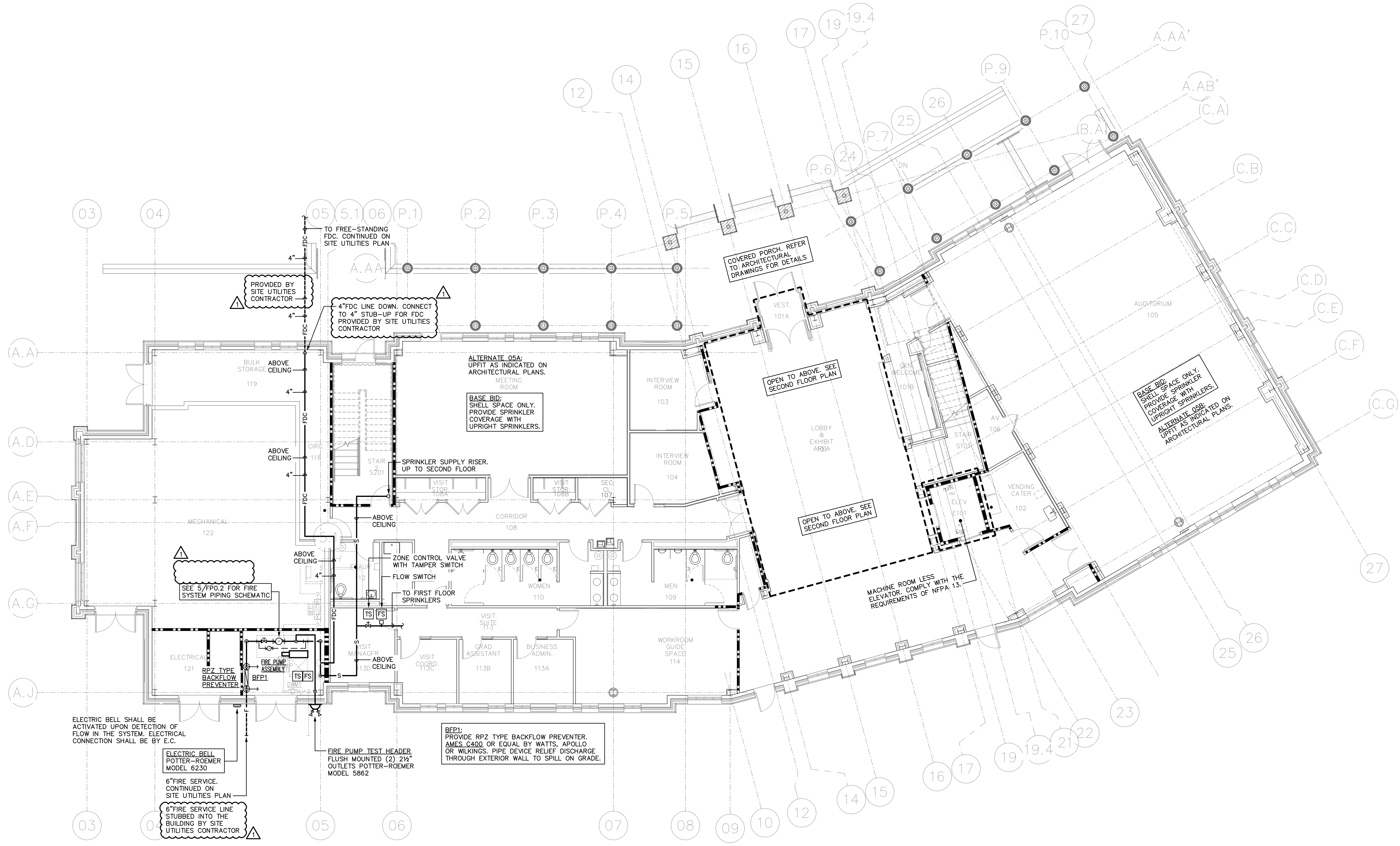
ISSUE DATE:	AUGUST 24, 2017
PHASE:	BID SET

#	DATE	REVISION
01	09.13.2017	ADDENDUM 02

FIRE PROTECTION
DETAILS

1604 — WTS PROJECT NO.
FP0.2 — SHEET

2 OF 4
OPTIMA #: 16-0056



1 FIRST FLOOR PLAN - FIRE PROTECTION
1/8" = 1'-0"

RATED WALL LEGEND

1 HOUR FIRE BARRIER

REFER TO ARCHITECTURAL DRAWINGS FOR COMPLETE WALL CONSTRUCTION AND RATING INFORMATION.

ARCHITECTURE
INTERIORS
PLANNING

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043866 DANIEL A. REVILLA
08.24.2017

ISSUE DATE:	AUGUST 24, 2017
PHASE:	BID SET

#	DATE	REVISION
01	09.13.2017	ADDENDUM 02

FIRE PROTECTION PLAN - 1ST FLOOR

1604	FP1.1
WTS PROJECT NO.	SHEET

VAV BOX SCHEDULE (HOT WATER HEAT)

SYMBOL	CFM		HOT WATER COIL			ENVIRO-TEC SDR	RUNOUT SIZE	REMARKS
	MAXIMUM	MINIMUM	BTUH	GPM	RUNOUT			
1.1	350	110	5000	0.3	1/2	6	8	
1.2	1250	380	16000	0.8	1/2	12	14	
1.3	575	180	8000	0.4	1/2	7	10	
1.4	360	110	5000	0.3	1/2	6	8	
1.5	625	625	25000	1.3	1/2	8	10	
1.6	150	50	2000	0.1	1/2	4	8	
1.7	500	150	6000	0.3	1/2	7	10	
1.8	340	110	5000	0.3	1/2	6	8	
1.9	350	110	5000	0.3	1/2	6	8	
1.10	1900	570	23000	1.2	1/2	14	14	
1.11	1900	570	23000	1.2	1/2	14	14	
2.1	225	70	3000	0.2	1/2	5	8	
2.2	400	120	5000	0.3	1/2	7	8	
2.3	450	140	6000	0.3	1/2	7	10	
2.4	225	70	3000	0.2	1/2	5	8	
2.5	125	40	2000	0.1	1/2	4	8	
2.6	450	140	6000	0.3	1/2	7	10	
2.7	350	110	5000	0.3	1/2	6	8	
2.8	480	150	6000	0.3	1/2	7	10	
2.9	400	400	16000	0.8	1/2	7	8	
2.10	350	110	5000	0.3	1/2	6	8	
2.11	200	60	3000	0.2	1/2	5	8	
2.12	480	150	6000	0.3	1/2	7	10	
2.13	450	140	6000	0.3	1/2	7	10	
2.14	325	100	4000	0.2	1/2	6	8	
2.15	1400	420	17000	0.9	1/2	12	14	
2.16	300	90	4000	0.2	1/2	6	8	
2.17	300	90	4000	0.2	1/2	6	8	
2.18	300	90	4000	0.2	1/2	6	8	
2.19	1400	420	17000	0.9	1/2	12	14	
2.20	450	140	6000	0.3	1/2	7	10	
2.21	500	150	6000	0.3	1/2	7	10	
2.22	320	100	4000	0.2	1/2	6	8	
2.23	250	80	4000	0.2	1/2	5	8	
2.24	600	180	8000	0.4	1/2	8	10	
2.25	750	230	10000	0.5	1/2	8	10	

NOTES:
1. MINIMUM INLET PRESSURE TO TERMINAL UNITS SHALL BE 0.75" W.G.
2. MAXIMUM PRESSURE DROP THROUGH TERMINAL UNITS SHALL BE 0.25" S.P.
3. FURNISH TERMINAL UNITS WITH: FACTORY MOUNTED DDC CONTROLS, ACOUSTICAL LINING, THERMOSTAT, CONTROL VOLTAGE TRANSFORMER.
4. MECHANICAL CONTRACTOR SHALL EXTEND CONTROL POWER WIRING (120 V) FROM J-BOX TO VAV BOX. 120 V J-BOX BY ELECTRICAL CONTRACTOR, WIRING FROM J-BOX AND FINAL CONNECTION TO UNIT BY MECHANICAL CONTRACTOR. COORDINATE LOCATION OF 120 V J-BOXES WITH ELECTRICAL CONTRACTOR.
5. DDC CONTROLS SHALL BE FURNISHED TO THE BOX MANUFACTURER BY THE CONTROLS VENDOR. BOX MANUFACTURER SHALL FACTORY MOUNT AND WIRE CONTROLS. INSTALLATION OF CONTROLS SHALL INCLUDE CONTROLS TRANSFORMER, CONTROL COVER, AND ALL WIRING AND LABOR FOR A COMPLETE AND OPERATIONAL SYSTEM.
6. THE ABOVE NOTED HEATING VALUES ARE BASED ON E.A.T. OF 55°F AND A L.A.T. OF 95°F
7. PROVIDE MINIMUM 2 ROW HEATING COILS

COMMISSIONING NOTE

MECHANICAL CONTRACTOR SHALL COORDINATE WITH OWNER'S COMMISSIONING AGENT AND PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR A FULLY COMMISSIONED PROJECT.

EQUIVALENT MANUFACTURERS LISTING

LISTING OF MANUFACTURER'S NAME DOES NOT GUARANTEE APPROVAL. ALL EQUIPMENT MUST MEET OR EXCEED QUALITY AND CAPACITIES OF SPECIFIED EQUIPMENT. FINAL APPROVAL WILL BE BASED ON EQUIPMENT SUBMITTALS. ANY MANUFACTURER NOT LISTED BUT WISHING TO BID THIS PROJECT SHALL SUBMIT A WRITTEN REQUEST A MINIMUM OF 14 DAYS PRIOR TO BID DATE OR AS INDICATED IN THE SPECIFICATIONS, PRIOR APPROVAL IS REQUIRED FOR ALL MANUFACTURERS NOT LISTED. SEE SPECIFICATIONS FOR ADDITIONAL REQUIRMENTS.

FANS: COOK, GREENHECK, PENN, TWIN CITY
AIR DISTRIBUTION: CARNES, METAL•AIRE, NAILOR, PRICE, TITUS
FIRE DAMPERS: NAILOR, RUSKIN, POTTORFF, PREFCO, SAFE-AIRE
DUCTLESS SPLIT SYSTEMS: DAIKIN, MITSUBISHI, PANASONIC, FMI
DDC CONTROLS: ALC, SCHNEIDER, ALERTON, HOFFMAN BUILDING TECH, JCI, ECS, PLATINUM BLDG SOL
PUMPS & HYDRONIC EQUIPMENT: PEERLESS, BELL & GOSSETT, TACO, PATTERSON, GRUNDFOS
FAN COIL UNITS: CARRIER, INTERNATIONAL, TRANE, DAIKIN
FACTORY ASSEMBLED MODULAR AIR HANDLERS: DAIKIN-MCQUAY, TRANE, CARRIER, YORK
UNIT HEATERS: MCQUAY, TRANE, CARRIER, PRICE
VARIABLE FREQUENCY DRIVES: ABB, CUTLER HAMMER, DANFOSS, EMERSON, SQUARE D
TERMINAL UNITS: PRICE, NAILOR, METAL•AIRE, TITUS, YORK
BASEBOARD HEATER: INDEECO, MARKEL, VULCAN

NOTE:
ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.

BASE BOARD ELECTRIC HEATER

EH-1

INDEECO – BBI- 1.0 KW., 120/1/60, 8.3 A

ELECT BASE BOARD HEATER W/ ENCLOSURE, 48" LONG, W/ REMOTE TSTAT MOUNTED BELOW DESK

DISCONNECT BY M.C.

2012 NORTH CAROLINA ENERGY CONSERVATION CODE

COMMERCIAL ENERGY EFFICIENCY – MECHANICAL SUMMARY

501.1 METHOD OF COMPLIANCE
☐ 2012 NCECC CHAPTER 5
☐ NC SPECIFIC COMCHECK PROVIDED
■ (EQUAL TO ASHRAE 90.1-2010)

501.2 APPLICATION COMPLIANCE
☐ 506.2.1 EFFICIENT MECH EQUIPMENT
■ 506.2.2 REDUCED LTG DENSITY
☐ 506.2.3 ENERGY RECOVERY SYSTEMS
☐ 506.2.4 HI EFFICIENCY DOMESTIC HW
☐ 506.2.5 ONSITE RENEWABLE ENERGY
☐ 506.2.6 DAYLIGHTING CONTROLS

301.1 CLIMATE ZONE 3A – MECKLENBURG COUNTY, NORTH CAROLINA

DESIGN CONDITIONS

EXTERIOR (ASHRAE 90.1-2010 TABLE D-1)

WINTER DRY BULB	18° F.
SUMMER DRY BULB	91° F.
SUMMER WET BULB	74° F.

INTERIOR (2012 NCECC SECTION 302.1)

WINTER DRY BULB	72° F.
SUMMER DRY BULB	75° F.

*PROVIDE 5°F DEADBAND PER 503.2.4.2

503.2 HEATING & COOLING LOADS AND EQUIPMENT & SYSTEM SIZING

BUILDING HEATING LOAD	1,100,000 BTUH (PEAK)
BUILDING COOLING LOAD	840,000 BTUH (PEAK)
INSTALLED HEATING CAPACITY	1,100,000 BTUH (provided by RUP)
INSTALLED COOLING CAPACITY	840,000 BTUH (provided by RUP)

503.2.3 & 506.2.1 – REQUIRED & INCREASED HVAC EQUIPMENT PERFORMANCE

SYSTEM DESCRIPTION – 4 PIPE CHW /HW AHUS WITH TERMINAL UNITS WITH HW REHEAT & 4 PIPE FCUS

■ MINIMUM HVAC EQUIPMENT EFFICIENCY COMPLIANCE – TABLE 503.2.3
☐ INCREASED HVAC EQUIPMENT EFFICIENCY COMPLIANCE – TABLE 506.2.1

EQUIP TYPE	SIZE CATEGORY (BTUH)	SUBCATEGORY	503.2.3 MINIMUM EFFICIENCY (b)	506.2.1 INCREASED EFFICIENCY	DESIGN EFFIC.
TABLE 5.3.2.3(1) – UNITARY AIR CONDITIONERS AND CONDENSING UNITS					
AIR COND, AIR COOLED	< 65,000 (<= 5 TONS)	SPLIT SYSTEM & SINGLE PACKAGE	13.0 SEER	15.0 SEER 12.5 EER	SEE SCHEDULE
AIR COND, AIR COOLED	>= 65,000 & < 135,000	SPLIT SYSTEM & SINGLE PACKAGE	11.2 EER (c)	12.0 EER 12.4 IPLV	SEE SCHEDULE
AIR COND, AIR COOLED	>= 135,000 & < 240,000	SPLIT SYSTEM & SINGLE PACKAGE	11.0 EER (c)	12.0 EER 12.4 IPLV	SEE SCHEDULE

b. IPLVS ARE ONLY APPLICABLE TO EQUIPMENT WITH CAPACITY MODULATION.
c. DEDUCT 0.2 FROM THE REQUIRED EERS AND IPLVS FOR UNITS WITH A HEATING SECTION OTHER THAN ELECTRIC RESISTANCE HEAT.

503.2.4 THRU 503.2.9

■ HVAC SYSTEMS ARE FULLY COMPLIANT WITH THE REQUIREMENTS FOR HVAC SYSTEM CONTROL, VENTILATION, ENERGY RECOVERY, DUCT AND PLENUM INSULATION AND SEALING, PIPING INSULATION, AND SYSTEM COMPLETION.

503.2.10 – AIR SYSTEM DESIGN AND CONTROL

☐ ALL FANS INSTALLED ON THE PROJECT ARE BELOW 5 HP AND ARE EXEMPT FROM THESE REQUIREMENTS.
■ FANS ABOVE 5 HP MEET THE CFM LIMITATIONS SHOWN BELOW:

OPTION 1 – FAN SYSTEM MOTOR NAMEPLATE HP – TABLE 503.2.10.1(1)

SYSTEM/UNIT	ALLOWABLE MOTOR BRAKE HP	DESIGN MOTOR BRAKE HP	DESIGN CFM
AHU-1 SUPPLY	18.6	15.0	SEE SCHEDULE
AHU-1 RETURN	5.1	3.0	SEE SCHEDULE

503.3 – SIMPLE HVAC SYSTEMS AND EQUIPMENT (PRESCRIPTIVE)

☐ PROJECT CONSISTS OF ONLY DX SINGLE ZONE SYSTEMS FULLY COMPLIANT WITH THE SIMPLE PRESCRIPTIVE REQUIREMENTS OF 503.3.

503.4 – COMPLEX HVAC SYSTEMS AND EQUIPMENT (PRESCRIPTIVE)

■ PROJECT CONSISTS OF HVAC SYSTEMS FULLY COMPLIANT WITH THE COMPLEX PRESCRIPTIVE REQUIREMENTS OF 503.4.

ELECTRICAL/MECHANICAL DEMARCATION

REFER TO DETAIL 9/M-5.2 FOR MECHANICAL CONTRACTOR'S RESPONSIBILITIES RELATED TO ELECTRICAL DISCONNECTS, STARTERS AND WIRING OF MECHANICAL EQUIPMENT. ALL DISCONNECTS, STARTERS AND WIRING (LOAD SIDE OF DISCONNECTS) SHALL BE FURNISHED AND INSTALLED BY M.C. UNLESS OTHERWISE NOTED IN DETAIL 9/M-5.2. COORDINATE ALL ELECTRICAL REQUIREMENTS WITH E.C. PRIOR TO ASSEMBLING SHOP DRAWING SUBMITTALS OR ORDERING EQUIPMENT.

MECHANICAL GENERAL NOTES

1. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.
2. ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. THIS INCLUDES ANY MODIFICATIONS TO ANY ASSOCIATED MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS REQUIRED BY THIS SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS. ALL SUPPLY, RETURN AND OUTSIDE AIR DUCTWORK SHALL BE WRAPPED WITH 2" THICK DUCT WRAP WITH VAPOR BARRIER. INSULATION (INCLUDING FLEXIBLE DUCT INSULATION) SHALL HAVE A MINIMUM INSTALLED R-VALUE OF 5.0. TRANSFER DUCTS SHALL BE LINED WITH 1" THICK CLOSED CELLULAR FOAM LINER FOR ACOUSTICAL PURPOSES. DUCT DIMENSIONS ON PLANS ARE FREE AREA SIZE.
4. ALL DUCTWORK SHALL BE SEALED PER THE REQUIREMENTS OF THE 2012 NCMC CODE. SEAL LOW PRESSURE SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK FOR SMACNA SEAL CLASS A, SMACNA LEAKAGE CLASS 4, REFER TO SPECIFICATION SECTION 233113 FOR PRESSURE CLASSIFICATION SYSTEM REQUIREMENTS.
5. ALL MEDIUM PRESSURE SUPPLY DUCTWORK MAINS (GREATER THAN 1.0"WC BELOW 3.0"WC) WILL BE SUBJECT TO PRESSURE TESTING PER SMACNA GUIDELINES (REGARDLESS OF DUCT PRESSURE CLASSIFICATION). SUPPLY MAINS SHALL BE TESTED AS A COMPLETE SYSTEM.
6. ALL PIPING, DUCTS, VENTS, ETC., EXTENDING THROUGH WALLS AND ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.
7. ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS, TO AVOID INTERFERENCE.
8. TEST AND BALANCE CONTRACTOR WILL BE PROVIDED BY THE GENERAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF ALL EQUIPMENT, VALVES, DAMPERS AND ACCESSORIES REQUIRED TO BALANCE THE SYSTEM WATER AND AIR FLOWS AS SPECIFIED. THE MECHANICAL CONTRACTOR AND SHALL ASSIST THE TEST AND BALANCE CONTRACTOR CONTRACTED BY THE G.C. DURING TESTING AND BALANCING. ALL MECHANICAL SYSTEMS SHALL BE BALANCED TO THE PERFORMANCE SPECIFICATIONS INDICATED ON PLANS, ANY EQUIPMENT OR SYSTEM FOUND TO BE DEFICIENT WILL BE CORRECTED AND RETESTED AT NO COST TO THE OWNER. TEST AND BALANCE CONTRACTOR WILL BE AABC OR NEBB CERTIFIED.
9. UPON PROJECT COMPLETION, THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER INSTALLATION INFORMATION IN ACCORDANCE WITH DIVISION 01 OF THE SPECIFICATIONS INCLUDING BUT NOT BE LIMITED TO: RECORD SUBMITTALS (WITH ANY SUBMITTAL REVIEW COMMENTS ADDRESSED), O&M MANUALS FOR EACH PIECE OF EQUIPMENT INCLUDING ALL SELECTED OPTIONS, THE NAME AND ADDRESS OF AT LEAST ONE SERVICE AGENCY, FULL CONTROL SYSTEM O&M AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, SCHEMATICS, FULL SEQUENCE OF OPERATION, AND PROGRAMMED SETPOINTS.
10. PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.
11. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE AND FILTER REMOVAL.
12. CONDENSATE DRAIN PIPING SHALL BE SCHEDULE TYPE "L" HARD DRAWN COPPER AND SHALL BE INSULATED PER THE SPECIFICATIONS. DRAINS FROM ALL COOLING COILS SHALL BE TRAPPED. DRAIN SIZE SHALL BE EQUIPMENT DRAIN CONNECTION SIZE (3/4" MINIMUM) WITH A MINIMUM DEPTH OF 4" OR 1.5 TIMES THE UNIT FAN TSP, WHICHEVER IS GREATER. UNIT TRAPPING SHALL COMPLY WITH ASSOCIATED MFR INSTALLATION REQUIREMENTS.
13. ALL REFRIGERANT PIPE SHALL BE NITROGENIZED ACR COPPER TUBE. SIZE, INSULATE, AND INSTALL REFRIGERANT PIPING PER MANUFACTURER'S RECOMMENDATIONS.
14. ANY DEVICE REQUIRING A THERMOSTAT FOR CONTROL SHALL BE FURNISHED WITH A THERMOSTAT WHETHER INDICATED ON THE DRAWINGS OR NOT.
15. INSTALL THE TOP OF ALL THERMOSTATS, SENSORS, AND SWITCHES AT 4'-0" (MAXIMUM) ABOVE FINISH FLOOR. COORDINATE EXACT THERMOSTAT LOCATION WITH OWNER PRIOR TO INSTALLATION. ANY DEVICE ON A PERIMETER WALL SHALL BE MOUNTED ON A FOAM-FILLED ELECTRICAL BOX, WITH ALL GAPS BETWEEN BOX AND WALL SEALED TO PREVENT INFILTRATION.
16. MECHANICAL CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 20'-0" FROM ANY OUTSIDE AIR INTAKE.
17. CHILLED WATER PIPING AND FITTINGS BELOW GRADE SHALL BE FACTORY PREINSULATED AS MANUFACTURED BY THERMACOR(OR EQUAL). CARRIER PIPE SHALL BE SCHEDULE 40 ASTM A53 GRADE B BEVELED FOR WELDING. INSULATION SHALL BE FOAMED IN-PLACE CLOSED CELL POLYURETHANE FOAM COMPLETELY FILLING THE ANNULUS BETWEEN THE CARRIER PIPE AND HPDE JACKETING. OUTER JACKETING SHALL BE HDPE.
18. ALL CHILLED WATER, AND HOT WATER PIPING SHALL MEET THE REQUIREMENTS OF SECTION 232113. ALL PIPING SHALL BE INSULATED PER SPECIFICATION SECTION 230700. ALL PIPING JACKETING, LABELING AND IDENTIFICATION SHALL MEET THE REQUIREMENTS OF SECTION 230553 (COLOR-CODED PVC JACKETING REQUIRED IN MECHANICAL ROOMS). MINIMUM PIPE SIZE SHALL BE 3/4".
19. ALL BRANCH CHILLED WATER AND HOT WATER PIPING SHALL PITCH UP IN DIRECTION OF FLOW WITH MANUAL AIR VENTS AT ALL HIGH POINTS AND 1/2" DRAIN VALVES AT ALL LOW POINTS.
20. PROVIDE UNIONS, FLANGES OR COUPLINGS AT CONNECTION TO ALL VALVES AND EQUIPMENT. DO NOT USE DIRECT WELDED OR THREADED CONNECTIONS TO VALVES, EQUIPMENT OR OTHER APPARATUS.
21. PROVIDE NON-CONDUCTING DIELECTRIC UNIONS WHENEVER CONNECTING DISSIMILAR METALS.
22. EQUIPMENT OPERATED DURING CONSTRUCTION SHALL USE FILTERED MEDIA TO PREVENT CONSTRUCTION DEBRIS FROM ENTERING COILS, DUCTWORK SYSTEMS, AIR TERMINALS ETC. AT COMPLETION OF CONSTRUCTION, MECHANICAL CONTRACTOR SHALL CLEAN ALL SYSTEMS WITH ALL CONTROL DEVICES WIDE OPEN AND REMOVE ANY REMAINING DEBRIS PRIOR TO TEST AND BALANCING. MECHANICAL CONTRACTOR SHALL REPLACE ALL FILTRATION WITH NEW FILTERS AT COMPLETION OF CONSTRUCTION. ANY DUCTWORK, AIR TERMINALS, AND/OR OTHER EQUIPMENT UPSTREAM OF FILTRATION SHALL BE CLEANED THOROUGHLY OF CONSTRUCTION DEBRIS BEFORE HANDING OVER TO OWNER. COORDINATE WITH OWNER/CM FOR ANY FILTER MAINTENANCE PROGRAM REQUIREMENTS.
23. ALL EQUIPMENT CONCRETE PAD SIZES FOR MECHANICAL EQUIPMENT SHALL BE CONFIRMED WITH APPROVED SHOP DRAWING SUBMITTALS AND ASSOCIATED UNIT MANUFACTURER ANCHOR LOCATIONS PRIOR TO FABRICATION/INSTALLATION. THE MECHANICAL AND PLUMBING CONTRACTORS SHALL COORDINATE THE EXACT LOCATION OF MECHANICAL EQUIPMENT HOUSEKEEPING PADS WITH THE FLOOR DRAIN LOCATIONS PRIOR TO INSTALLATION OF DRAINS.
24. ALL PIPING AND DUCTWORK SHALL BE SUPPORTED IN ACCORDANCE WITH THE SPECIFICATIONS, AND FURTHER SUPPORTS OR HANGERS SHALL BE PROVIDED AS REQUIRED TO PREVENT THE WEIGHT OF PIPING BEING PLACED ON EQUIPMENT.
25. DUCTWORK AND PIPING PASSING THROUGH/ABOVE ELECTRICAL ROOMS SHALL BE CLOSELY COORDINATED WITH THE ELECTRICAL CONTRACTOR. DUCTWORK OR PIPING SHALL NOT BE LOCATED ABOVE ELECTRICAL PANELS.
26. EXTEND ALL DRAIN LINES TO NEAREST FLOOR DRAIN OR AS INDICATED SO ROUTED AS TO AVOID INTERFERENCE WITH PASSAGEWAYS AND MAINTENANCE.
27. ALL VALVES AND SPECIALTIES SHALL BE LINE SIZE UNLESS NOTED OTHERWISE, USING ECCENTRIC REDUCERS (FLAT ON BOTTOM) WHENEVER PIPING TRANSITIONS ARE REQUIRED. AT INLINE PUMP SUCTION THE ECCENTRIC REDUCER SHALL BE FLAT ON TOP OF PIPE.
28. PRIOR TO TURNING ALL HYDRONIC SYSTEMS OVER TO THE OWNER SYSTEMS, A SYSTEM FLUSHING CONNECTING TO EXTG RUP-4 PIPING AND CHEMICAL TREATMENT REPORT SHALL BE PROVIDED AND VERIFIED BY THE OWNERS COMMISSIONING AGENT.
29. CONTROLS VALVES, DAMPERS, AND BAS CONTROLLERS SHALL BE INSTALLED A MAXIMUM OF 2 FEET ABOVE THE CEILING AND WHERE INSTALLED ABOVE AN INACCESSIBLE CEILING A MINIMUM OF 2'x2' ACCESS DOOR SHALL BE PROVIDED. COORDINATE WITH ARCHITECTURAL PLANS FOR LOCATIONS AND CEILING TYPES.
30. ALL EXPOSED DUCTWORK, EQUIPMENT, PIPING, HANGERS, ETC. TO MATCH CEILING FINISH MECHANICAL CONTRACTOR SHALL COORDINATE PAINTING WORK, TO ENSURE NO AREAS/SURFACES ARE PAINTED THAT WOULD AFFECT UNIT IDENTIFICATION OR OPERATION.
31. VALVES MOUNTED 12' OR GREATER A.F.F SHALL BE PROVIDED WITH CHAIN OPERATORS.
32. ALL MOTORS PROVIDED FOR EQUIPMENT IN MECHANICAL ROOM SHALL BE PROVIDED WITH A T.E.F.C. ARRANGEMENT.
33. ALL CLOSED LOOP PIPING SYSTEMS SHALL BE FLUSHED USING PRODUCT AND SERVICES BY THE UNIVERSITIES CHEMICAL TREATMENT PROVIDER.
34. PROVIDE SHAFT GROUNDING RINGS ON ALL MOTORS SERVED BY A VFD, ALL VFDS SHALL BE 6 PULSE, ALL MOTORS FED FROM A VFD SHALL BE INVERTER DUTY RATED
35. MECHANICAL CONTRACTOR SHALL CONFIRM ALL SCCR RATINGS OF EQUIPMENT PROVIDED MATCHES THE REQUIREMENTS OF THE ELECTRICAL BREAKER RATINGS SHOWN ON THE ELECTRICAL PLANS.
36. MECHANICAL CONTRACTOR SHALL PROVIDE DUCT AND PIPING FABRICATION SHOP DRAWINGS COORDINATED WITH ALL OTHER TRADES. ROUTING SHALL BE FILED VERIFIED PRIOR TO FABRICATION.

MECHANICAL DRAWING INDEX

MECHANICAL PROJECT NOTE

THIS PROJECT UTILIZES AN ABOVE CEILING PLENUM RETURN:

ALL MATERIALS WITHIN PLENUMS SHALL BE NONCOMBUSTIBLE OR SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPED INDEX OF NOT MORE THAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E 84E

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	ABBR.
CHS	CHILLED WATER SUPPLY	CHS
CHR	CHILLED WATER RETURN	CHR
HWS	HOT WATER SUPPLY	HWS
HWR	HOT WATER RETURN	HWR
D	CONDENSATE DRAIN	D
PD	PUMPED CONDENSATE	PD
CW	COLD WATER MAKE-UP	CW
	BUTTERFLY VALVE	
	3-PIECE BALL VALVE	
	GATE VALVE	
	CHECK VALVE	
	STRAINER WITH BLOWDOWN VALVE WITH HOSE CONN.	
	BALANCING VALVE	
	B&G CIRCUIT SETTER	
	UNION	
	THERMOMETER	
	PRESSURE GAGE & COCK	
	GAGE COCK	
	FLOW SWITCH	
	ECCENTRIC REDUCER CONCENTRIC REDUCER	
	CONTROL VALVE	
DP	DIFFERENTIAL PRESSURE SENSOR	
T	TEMPERATURE GAUGE	
FM	COMBINATION FLOW / BTU METER	
	PRESSURE REDUCING/REGULATING VALVE	
	SOLENOID VALVE	
3WV	3-WAY VALVE	
T	THERMOSTAT / TEMP SENSOR (4'-0" AFF TO TOP)	
H	HUMIDISTAT (4'-0" AFF TO TOP)	
S	SWITCH (4'-0" AFF TO TOP)	
P	BAROMETRIC PRESSURE SENSOR	
	SUPPLY AIR DIFFUSER (4-WAY)	
	RETURN AIR GRILLE	
	RETURN AIR GRILLE WITH SOUND ATTENUATION (SEE DETAIL)	
	EXHAUST AIR GRILLE	
	DOUBLE LINE DUCTWORK	
	SINGLE LINE DUCTWORK	
FD	FIRE DAMPER W/ ACCESS DOOR (SEE DETAIL)	
FSD	COMBINATION FIRE/SMOKE DAMPER W/ ACCESS DOOR (SEE DETAIL)	
20/14	20"x14" FLAT OVAL DUCT	
20x14	20"x14" RECTANGULAR DUCT	
20x14L	20"x14" RECTANGULAR DUCT LINED	
8ø	8" DIAMETER ROUND DUCT	
SD	DUCT MOUNTED SMOKE DETECTOR W/ ACCESS DOOR	
SP	STATIC-PRESSURE SENSOR	
M	MOTORIZED DAMPER	
BD	BACKDRAFT DAMPER	
C	CARBON MONOXIDE SENSOR	
CO2	CARBON DIOXIDE SENSOR	
U	UNDERCUT DOOR	
M.C.	MECHANICAL CONTRACTOR	
E.C.	ELECTRICAL CONTRACTOR	
P.C.	PLUMBING CONTRACTOR	
N.I.C.	NOT IN CONTRACT	
AFF	ABOVE FINISHED FLOOR	
DN	DOWN	
UP	UP	

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08.24.2017

ISSUE DATE:	AUGUST 24, 2017
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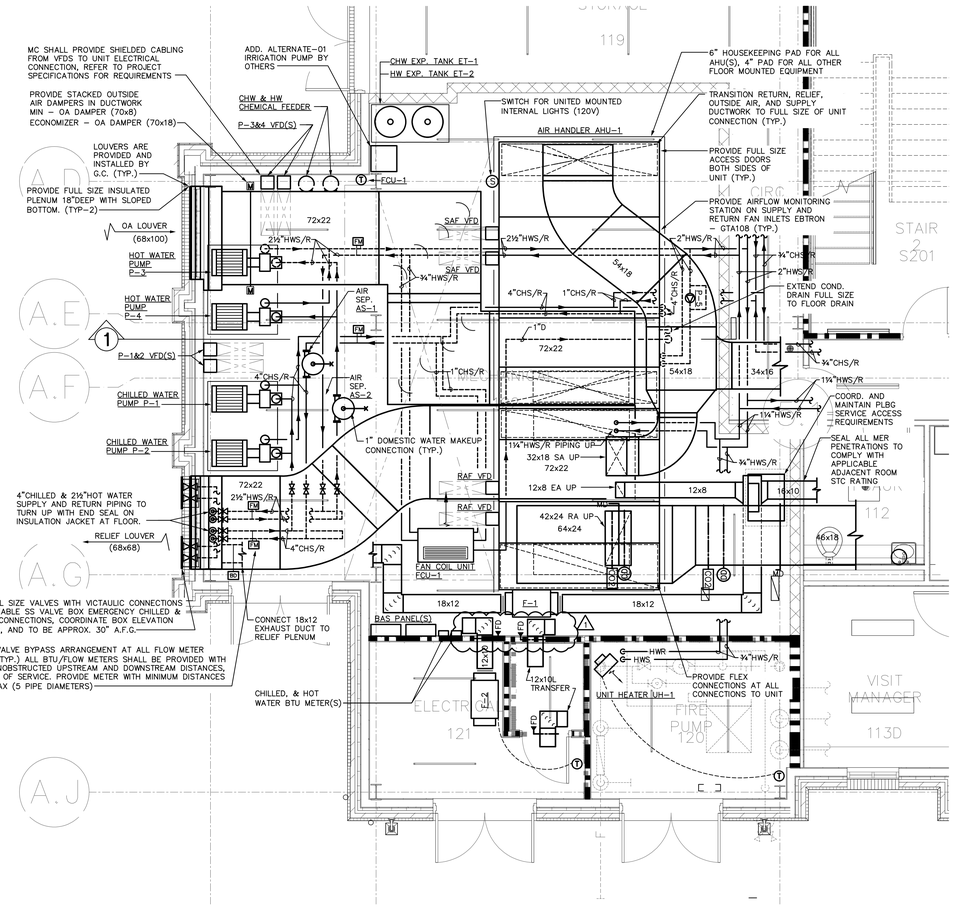
#	DATE	REVISION
01	9/13/17	ADD.02

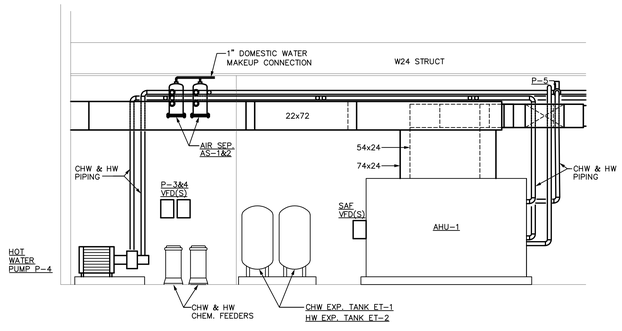
MECHANICAL LEGEND, NOTES, AND SCHEDULES

1604 WTS PROJECT NO.
M0.1 SHEET

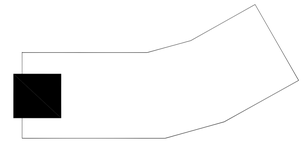
1 OF 13
OPTIMA #: 16-0056



1 ENLARGED MECHANICAL ROOM
1/4" = 1'–0"



2 MECHANICAL ROOM – SECTION–1
1/4" = 1'–0"



KEYPLAN
NTS

RATED WALL LEGEND

1 HOUR FIRE BARRIER

REFER TO ARCHITECTURAL DRAWINGS FOR COMPLETE WALL CONSTRUCTION AND RATING INFORMATION.

TRUE PLAN

0' 4' 8' 16' 32'

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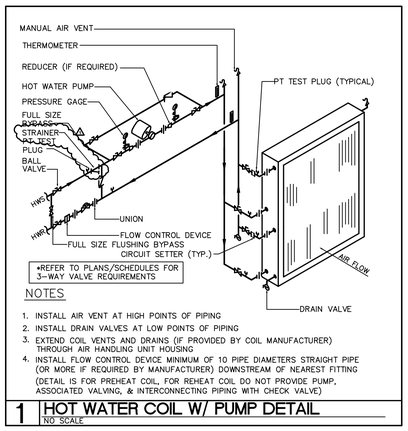
ENLARGED MECHANICAL ROOM

1604 WTS PROJECT NO.

M4.1 SHEET

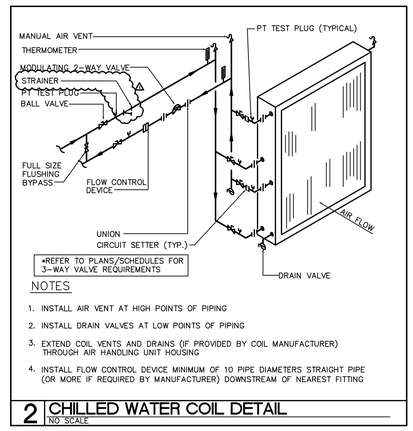
10 OF 13
OPTIMA #: 16-0056



NOTES

1. INSTALL AIR VENT AT HIGH POINTS OF PIPING
2. INSTALL DRAIN VALVES AT LOW POINTS OF PIPING
3. EXTEND COIL VENTS AND DRAINS (IF PROVIDED BY COIL MANUFACTURER) THROUGH AIR HANDLING UNIT HOUSING
4. INSTALL FLOW CONTROL DEVICE MINIMUM OF 10 PIPE DIAMETERS STRAIGHT PIPE (OR MORE IF REQUIRED BY MANUFACTURER) DOWNSTREAM OF NEAREST FITTING (DETAIL IS FOR PREHEAT COIL, FOR REHEAT COIL DO NOT PROVIDE PUMP, ASSOCIATED VALVING, & INTERCONNECTING PIPING WITH CHECK VALVE)

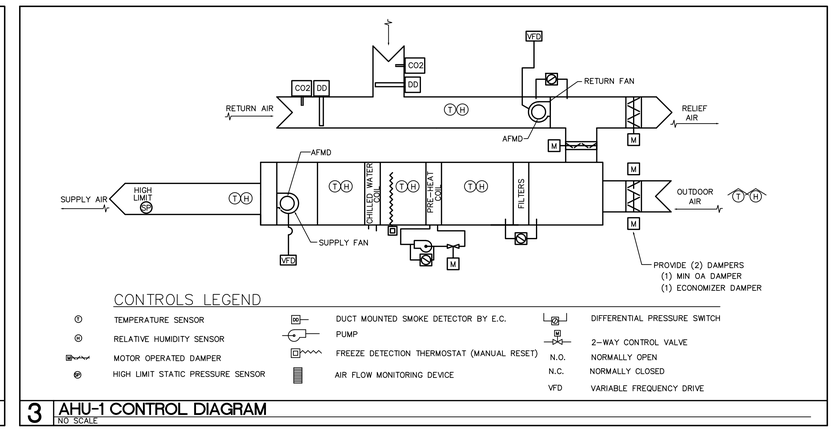
1 HOT WATER COIL W/ PUMP DETAIL
NO SCALE



NOTES

1. INSTALL AIR VENT AT HIGH POINTS OF PIPING
2. INSTALL DRAIN VALVES AT LOW POINTS OF PIPING
3. EXTEND COIL VENTS AND DRAINS (IF PROVIDED BY COIL MANUFACTURER) THROUGH AIR HANDLING UNIT HOUSING
4. INSTALL FLOW CONTROL DEVICE MINIMUM OF 10 PIPE DIAMETERS STRAIGHT PIPE (OR MORE IF REQUIRED BY MANUFACTURER) DOWNSTREAM OF NEAREST FITTING

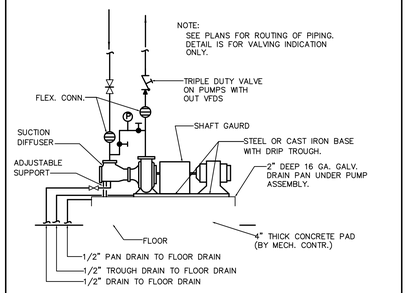
2 CHILLED WATER COIL DETAIL
NO SCALE



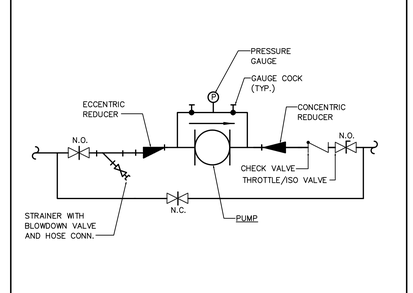
CONTROLS LEGEND

T	TEMPERATURE SENSOR	DUCT MOUNTED SMOKE DETECTOR BY E.C.	DIFFERENTIAL PRESSURE SWITCH
H	RELATIVE HUMIDITY SENSOR	PUMP	2-WAY CONTROL VALVE
	MOTOR OPERATED DAMPER	FREEZE DETECTION THERMOSTAT (MANUAL RESET)	N.O. NORMALLY OPEN
HL	HIGH LIMIT STATIC PRESSURE SENSOR	AIR FLOW MONITORING DEVICE	N.C. NORMALLY CLOSED
			VFD VARIABLE FREQUENCY DRIVE

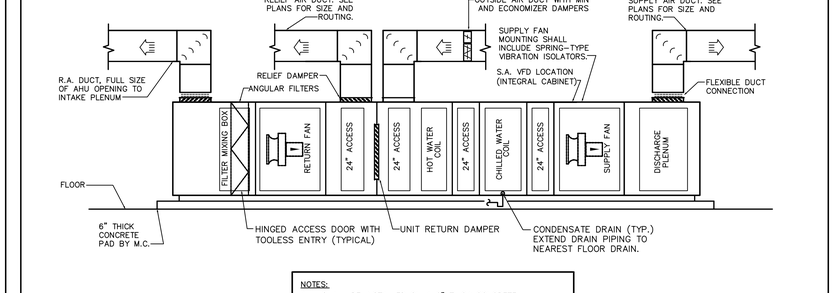
3 AHU-1 CONTROL DIAGRAM
NO SCALE



4 PUMP PIPING DETAIL (P-1 THRU P-4)
NO SCALE

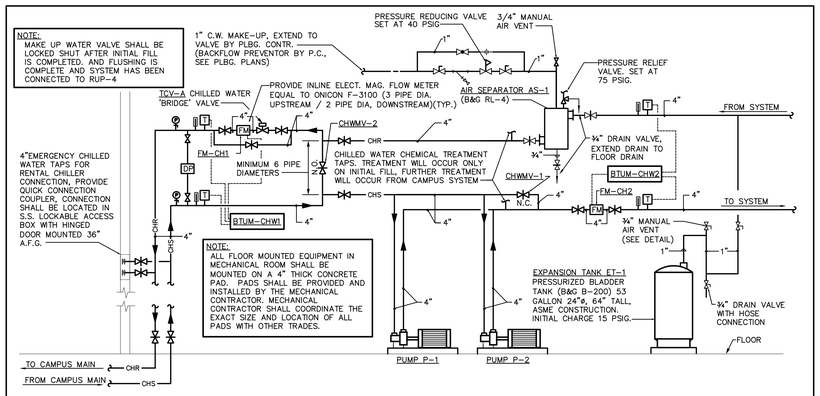


5 INLINE PUMP DETAIL
NO SCALE

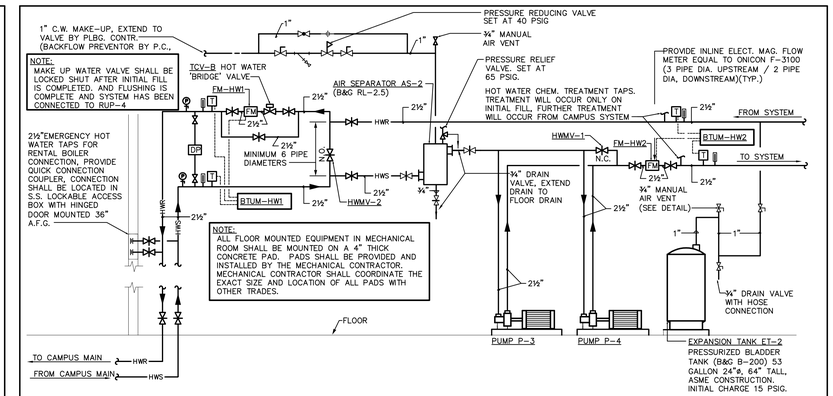


NOTES:
AHU SHALL BE INSTALLED ON A 6" THICK CONCRETE HOUSEKEEPING PAD. AHU PAD SHALL BE REINFORCED WITH 6x6-10/10 WIRE MESH. MECHANICAL CONTRACTOR SHALL CLOSELY COORDINATE EXACT LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS PRIOR TO FINAL LOCATION OF PADS.

6 AIR HANDLER AHU-1 DETAIL
NO SCALE



7 CHILLED WATER PIPING SCHEMATIC
NO SCALE



8 HOT WATER PIPING SCHEMATIC
NO SCALE

RATED WALL LEGEND

1 HOUR FIRE BARRIER

REFER TO ARCHITECTURAL DRAWINGS FOR COMPLETE WALL CONSTRUCTION AND RATING INFORMATION.

TRUE PLAN

0' 4' 8' 16' 32'

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ENLARGED MECHANICAL DETAILS AND SCHEMATICS

1604 — WTS PROJECT NO.
M4.2 — SHEET

11 OF 13
OPTIMA #: 16-0056