SEWER LINE INVESTIGATION

Asnuntuck Community College

MAY 4, 2023

BSC GROUP
BUILD | SUPPORT | CONNECT

PREPARED FOR

Asnuntuck Community College

CT Department of Administrative Services

Project No. BI-CTC-651

Contents

1. Introduction

BSC Group, Inc. (BSC) is pleased to submit the following summary of findings and recommendations to the Connecticut Division of Administrative Services (CT DAS) following various investigations of the existing sewer system at Asnuntuck Community College (ACC) in Enfield, Connecticut. BSC performed this investigation in accordance with the applicable provisions of our On-Call contract with the Department of Administrative Services (DAS) Contract No. OC-DCS-CIV-LA-0045.

Background:

BSC attended a Project initiation meeting on February 8, 2023 with representatives from CT DAS and ACC facilities to review information provided by the school in advance of the meeting and to understand from representatives on the scene what issues occurred.

At the meeting, facility representatives indicated that in previous semesters, a janitor's closet wash sink, toilets and floor drains in the men's and women's restrooms on the ground floor on the eastern side of the building flooded. The clog was severe enough to require emergency jetting to release the clog. This flooding situation occurred a number of times during that semester.

Prior to the meeting, DAS provided to BSC the bid set for the Campus Renovations Project No. BI-CTC-437 for the renovations at ACC construction after 2015 at the campus. BSC reviewed the document and determined that Sheet No. P2.201 identifies a 4" sanitary discharge pipe running east by a set of bathrooms on the ground floor. From these bathrooms, the sanitary discharge pipe turns north in a main hallway, passing a café, before upsizing to a 6" pipe and exiting the building.

During the meeting, representatives indicated the bathroom identified on the above-mentioned sheet is the bathroom that previously flooded. Representatives expressed concern of a potential "belly" in the sanitary discharge, either caused by faulty construction or settlement of base material beneath the sanitary piping. This belly, if severe enough in depth, could potentially cause the slowing or even stoppage of sewage as it exits the facility. This slowing or stoppage of sewage flow could cause a situation where solids and paper in the sewage could begin to accumulate over time, resulting in an eventual clog.

ACC Representatives also supplied to BSC a CCTV inspection that was performed at the time the clogs were occurring for further background information and comparison purposes.

Please find Sheet P2.201 attached as Appendix A with the sanitary discharge pipe highlighted for clarity.

2. Investigation

Closed Circuit Television Inspection:

A component of BSC's investigation is to ascertain the potential presence of a "belly" in the sanitary piping system in question. This physical observation is most easily accomplished through the use of a Closed Circuit Television Camera inspection (CCTV).

For this procedure, a small lighted camera on a long flexible lead is threaded into the sanitary system at a convenient system access point, such as a system clean out. The camera is designed to record the total distance it travels along the piping system and is also designed to be traceable, meaning the camera location can be identified below grade through non-invasive means using a locator wand on the surface. This allows the investigator the ability to pinpoint the location of a clog, or abnormality in the pipe at a precise location on the surface, potentially saving the need for costly investigative measures. The additional benefit of the CCTV inspection is the ability to examine all points in the discharge line for signs of clogging, damage, accumulated sewage, root encroachment, etc.

BSC contracted with Fletcher Sewer and Drain Services of Ludlow Massachusetts for the purposes of performing the CCTV inspection of the sanitary discharge piping in the location where flooding previously occurred.

Prior to the investigation, BSC identified three (3) potential cleanout locations in the floor slab as potential entrance points for the CCTV. The cleanout locations are identified in Appendix A by red circles.

On February 20, 2023, representatives from BSC, ACC, and Fletcher Sewer were onsite to perform the CCTV inspection.

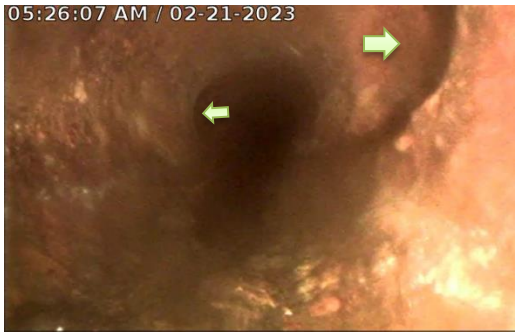
At just after 9:30 am, the Fletcher contractor opened the primary in-line cleanout located at the start of the sanitary discharge run with the history of flooding. This cleanout is located at the farthest point away from the discharge from the building and will allow the camera to pass all relevant connections that flooded in the past, including the floor sink in the janitor's closet, the women's bathroom toilets and floor drain, the men's bathroom toilets and floor drain, the 90-degree bend to the north, and the discharge to the sewer manhole located within the front plaza. The primary in-line cleanout is identified on Appendix A with a double red circle.

Documentation of Inspection

Fletcher Sewer and Drain provides with their service a USB drive with the recorded inspection saved for project record. Please see Appendix B for the 16-minute-long CCTV video of the inspection of the line.

The major points in the video are documented below in order at which they were observed.

1. The clip starts with inserting the camera into the system and through the cleanout companion flange that closes off the piping while not in use. Once in the pipe, the initial view shows the apparent women's bathroom sink connection on the right and the janitor closet just beyond on the left (2'0" - 0:50 sec)



Green arrows represent inlets into line.
(disregard time shown on camera)

2. At 7'7", sewage level is above the camera lens.
3. At 12'0", the camera is just above the water level and waste in the form of toilet paper is evident in front of the camera. The important information garnered from this is that the flow is not blocked through this section since the camera is not below the water level. In the Fletcher technician's previous experience, the blocked sewage from 7' to 12' is simply a toilet paper blockage and will disintegrate quickly.

Toilet paper evident at 12'.

4. From approximately 12' to 38' the sewage is again above the camera lens.
5. At approximately 38'9" (1:28 sec.) the camera again enters free flowing pipe. The technician felt the camera pass through the two 45° bends shown on the plumbing design. There is additional evidence of toilet paper in the piping again potentially restricting the free flow of sewage from 12' to 38'.

Toilet paper evident at 38'.

6. From 39' through to 56' and beyond the piping appears to be 100% clear and free flowing.

Pipe clear beyond 39'.

7. At approximately 66', debris collects on the camera lens and obscures the view. Speaking with the Fletcher technician, the camera is still sliding freely down the pipe, so there is no physical obstruction.
8. Although still obscured, there is evidence at 78' of free flowing material in the pipe (observed on the lower left corner of the screen where flowing material flowing by the stationary camera is evident.)
9. At 86', the piping transitions from Ductile Iron Pipe to green PVC. At this time BSC requested the Fletcher Technician to field locate the camera from the surface. The camera was ultimately located approximately 5' from the front planter area in the entry plaza, outside the building.

Green PVC Beyond 86'.

10. The technician extended the camera out to 129' 8" with no obstructions, at which point further extension was halted to prevent the potential for getting stuck in a manhole.

3. Analysis

Analysis of the CCTV inspection, as well as other information collected throughout this investigation, reveal a number of relevant facts that can be used to develop potential theories why there is a history of flooding in the bathrooms and janitors closet in question. They include (in no particular order):

1. Upon performing the CCTV investigation, it was apparent the piping beneath the slab in the building is Ductile Iron Pipe (D.I.P.). D.I.P has a history of interior deterioration overtime, causing scale to form and in some cases, begin to delaminate from the interior sidewalls of the pipe. This delamination can pull away from the walls, creating a sharp edge that debris can snag on and get stuck.
2. There were two locations in the section of piping investigated that showed accumulated sewage of enough volume to cover the camera lens (the camera is approximately 1.5" high). These areas were easily pushed through with the camera manually by the Fletcher technician, and in his experienced opinion, the blockages were most likely caused by an accumulation of toilet paper only (most likely on the bottom of the pipe). There was no apparent damage to any of the piping observed, and no apparent evidence of a "sag" or "belly" in the system accumulating sewage. All clear piping appeared to be flowing freely throughout the entire investigated run.
3. Toilet paper is designed to break down relatively quickly in sanitation systems. However, there is industry wide anecdotal evidence that many other products make their way into toilets every year, such as facial tissues, paper towels, sanitary napkins, "Flushable wipes", and quite often cloths or pieces of fabric. These products do not break down with the rapidity of toilet paper and pose a much greater risk in causing a blockage that will not disintegrate over time. These materials also have a high potential to "snag" on the delaminated layers of D.I. pipe mentioned in item 1, above.
4. Through conversation with ACC facilities representatives, it was determined that a regular maintenance schedule for the building sanitary piping, consisting of routine cleaning and other measures, has never been implemented.
5. Also through conversations with ACC staff, the flooding events apparently occurred over a defined time-period in 1 semester, after which the line was water-jet cleaned. There is a possibility the issues observed at the college were the result a single individual using an excess amount of toilet paper, or some other temporary cause at that time.

4. Summary of Findings and Recommendations

Given the above information provided to BSC from representatives from ACC and gathered through the CCTV investigation, a number of theories to the origin of the flooding could be constructed, all with relatively equal likelihood of occurrence.

Therefore, BSC cannot definitively determine the root cause of the flooding. What BSC can provide are the following summary of findings:

1. The sanitary piping observed during the CCTV inspection did not identify any evidence of "bellying" or "Sagging" in any of the piping observed. Therefore, no slab cutting or physical alteration of the existing sanitary piping is necessary.
2. The CCTV inspection did not identify any substantial clogs or buildup that caused undue concern or need for immediate corrective action. Those open areas that were observed are free flowing, draining to the exit point from the building.

Recommendations:

BSC would like to offer the following recommended maintenance regimen to ACC to mitigate the potential for clogs or flooding to occur in the future:

1. CCTV Inspection (Ever Year)
    a) The night prior to a period of low flow (weekend or day when the college is closed), the toilets in the men's and women's restrooms should be flushed consecutively to clear any minimal reduction in flow due to accumulated toilet paper.
    b) 12 hours after the initial flush, perform a CCTV inspection to observe the condition of the sanitary piping system. Look for scaling of the pipe interior walls that could cause a snag, "bellies" holding water, evidence of damage or excessive deterioration of the piping, etc.
    c) Record findings for future reference.
2. Jetting (Every 2-3 years)

    A nozzle directs high-pressure jets of water against the pipe walls to clear debris and grease buildup and can clear blockages. Usually enters from the outlet point of the discharge and uses the force of the jet to propel itself up the pipe. Once to the end, the nozzel is pulled back out to clear any remaining debris.
3. Rodding or Snaking (as needed depending on severity of clog or delamination of interior walls of pipe)

    Uses a rotating drive unit and rods with a rotating blade at the end that fits inside the pipe an scours the inside of the pipe clear of grease deposits, clogs, stuck debris, and pipe scale.

    Rodding can be highly effective in clearing piping, but also has the potential to damage severely deteriorated piping and should be used only as specifically needed.

Conclusion:

Following the CCTV inspection and investigation of the actions taken in the past few years, the sanitary system associated with the historic flooding issues appears to be operating effectively at this time. BSC was unable to identify any significant issues with the building's sanitary sewer piping system that was investigated. With continued maintenance as recommended in this report, there is little evidence to suggest that the system will not function for the remaining duration of its service life.

Appendix A: "First Floor Plumbing Construction Plan"

Plan Sheet P2.201

PLUMBING DRAWING NOTES

1. CONNECT NEW 2"CW TO EXISTING IN THIS AREA. VERIFY LOCATION IN THE FIELD.
2. CONNECT NEW 4" BURIED STORM TO EXISTING IN THIS AREA. VERIFY LOCATION IN THE FIELD.
3. 1 1/2"CW DROP TO. EXTEND TO WOMEN'S WATER CLOSETS. PROVIDE WATER HAMMER ARRESTOR (WHA).
4. 1 1/2"CW DROP. EXTEND TO MEN'S WATER CLOSET AND URINAL. PROVIDE WATER HAMMER ARRESTOR (WHA).
5. 2"W. DN. 1 1 /2"V, 1/2"H&CW DROP TO LAVATORIES. PROVIDE TMV-1 AT EACH LAVATORY
6. 3"W. DN. 1 1/2"V., 1/2"H&CW DROP TO JAN. SINK
7. 1 1/2"W.,DN. 1 1 /2"V., 1/2"CW. DROP TO EWC.
8. INSTALL FLOOR DRAIN WITH TRAP GUARD AND DEEP SEAL "P" TRAP. SEE TRAP GUARD DETAIL ON DWG. #P4.101
9. CONNECT NEW BURIED STORM TO EXISTING 12" STORM IN THIS AREA. VERIFY LOCATION IN THE FIELD AND ADJUST AS NECESSARY. COORDINATE WITH CIVIL WORK.
10. CONNECT NEW 6" BURIED SANITARY TO EXISTING 6" SANITARY IN THIS AREA. VERIFY LOCATION IN THE FIELD AND ADJUST AS NECESSARY. COORDINATE WITH CIVIL WORK.
11. ELECTRIC WATER HEATER MOUNT HIGH ON WALL. PROVIDE SHELF AS REQUIRED. CONNNECT 3/4"H&CW. PIPE T&P RELIEF VALVE TO DRAIN PAN AND PAN DRAIN TO JAN. SINK 6" ABOVE RIM. SEE DETAIL ON DRAWING #P4.101
12. NOTE: PLUMBING CONTRACTOR SHALL VERIFY EXACT LOCATION AND INVERT ELEVATION OF OF EXISTING BURIED SANITARY OR STORM PIPING AT THIS POINT PRIOR TO ANY EXCAVATION FOR NEW PIPING INSTALLATION. COORDINATE WITH CIVIL WORK.
13. OVERFLOW RAIN WATER LEADER. PIPE THROUGH EXTERIOR WALL & TERMINATE W/ J.R. SMITH #1770-BS-NB, NICKEL BRONZE DOWNSPOUT NOZZLE WITH BIRD SCREEN. COORDINATE FINAL LOCATION WITH ARCHITECT.
14. EXISTING 3/4" HWR & 1-1/4" HW (140°F) - ABANDONED IN PLACE - DO NOT REUSE.
15. EXISTING 3/4" HWR - ABANDONED IN PLACE - DO NOT REUSE.
16. 6" RWL FROM ENTRY ROOF - PIPE TO RAIN GARDEN. SEE ARCHITECTURAL AND CIVIL DRAWINGS FOR DETAILS.

Bathroom Location

Primary in-Line Clean-out Location (Student Lounge)

Cafe Tie-in

Sanitary Discharge Pipe

Janitor Closet Location

EXISTNG 2"CW, 1 1/4"HW, 3/4"HWR

EXIST. 10"ST TO REMAIN

EXIST 5" RWL DN.

EXIST 4" RWL UP TO RD

NEW 4" RWL UP&DN (1870 SF)

4"RWL UP&DN (2180 SF)

6"RWL UP (3540 SF)

EXIST 5" RWL UP (3170 SF)

NEW 8" RWL DN

(6710 SF)

(8890 SF)

(2180 SF)

CONNECT NEW 3" GAS TO EACH IN THIS AREA (V.I.F.)

NEW 1 1/2" GAS UP TO RELOCATED RTU-2A

NEW 1 1/2" GAS UP TO RELOCATED RTU-1A ON ROOF

OUTLINE OF RELOCATED RTU ON ROOF

NEW 1-1/2" CW

NEW 2"CW

1-1/2" V DN

4" S. DN. 4" V. RISE

1-1/2"V DN 3/4" H&CW

1/2"H&CW & 1-1/2" W UP, 1-1/2" W DN. CONNECT TO 3" BURIED WASTE

4"V UP

3"FD-1

EWC

EWH-1

EEW-1

8"ORWL UP (9360 SF) 4" RWL UP & DN (1770 SF)

8"ORWL DROP TO DOWNSPOUT NOZZLE (9360 SF)

3/4" CW UP WITH SHUT-OFF VALVE, PROVIDE A.D. FOR VALVE

(1770 SF)

EXIST. 6"SANITARY

SEISMIC JOINT. PROVIDE FLEXIBLE CONNECTIONS AND FIRE STOPPING PER SPECIFICATIONS

1 P2.201 FIRST FLOOR PLUMBING CONSTRUCTION PLAN
1/8" = 1'-0"

CALLED NORTH

KEYPLAN

drawing title: FIRST FLOOR PLUMBING CONSTRUCTION PLAN

REVISIONS

mark	date	description

STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES

drawing prepared by:
TECTON ARCHITECTS
ONE HARTFORD SQUARE WEST
HARTFORD, CT 06106

project:
CAMPUS RENOVATIONS - ASNUNTUCK COMMUNITY TECHNICAL COLLEGE

170 ELM STREET
ENFIELD, CT

project number: BI-CTC-437

date: 04-27-2015
scale: 1/8" = 1'-0"
production leader
project manager: IP
project architect:
peer reviewer:
drawing no. P2.201

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STRUCTURAL, MECHANICAL, ELECTRICAL AND TECHNOLOGY

STATE OF CONNECTICUT GREGORY H. VAN ARSDALE LICENSE NO. 17928 PROFESSIONAL ENGINEER

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MECHANICAL GENERAL NOTES

GENERAL
1. THE PROJECT DRAWINGS AND SPECIFICATIONS ARE BASED ON THE CONSTRUCTION SPECIFICATIONS INSTITUTE (CSI) DOCUMENTATION FORMAT. SPECIFICATION AND DRAWING CONTENTS ARE ARRANGED BY TOPIC AND CATEGORY AND ARE NOT INTENDED TO AWARD DIVISION OF WORK.
2. THE INTENT OF THESE DOCUMENTS IS FOR THE MEP TRADES TO FURNISH AND INSTALL COMPLETE MECHANICAL AND ELECTRICAL SYSTEMS. THE SPECIFIED FIRE PROTECTION, PLUMBING, HVAC, ELECTRICAL AND SPECIAL SYSTEMS SHALL BE COMPLETE IN ALL RESPECTS; OPERATIONAL, TESTED, ADJUSTED, CALIBRATED, APPROVED BY THE AUTHORITIES HAVING JURISDICTION AND READY FOR BENEFICIAL USE BY THE OWNER.
3. THE TRADES SHALL OBTAIN AND REVIEW ALL CONTRACT DOCUMENTS BEFORE SUBMITTING A BID. INFORMATION IS PROVIDED ON THE VARIOUS DRAWINGS, SCHEDULES, SPECIFICATIONS AND ALL OF THE VARIOUS DOCUMENTS IN THE BIDDING PACKAGE. THE CONTRACT DOCUMENTS ARE COMPLEMENTARY AND FORM A TOTAL PROJECT DESIGN AND INFORMATION SOURCE FOR CONSTRUCTION PURPOSES.
4. THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT. COORDINATE LOCATIONS OF EQUIPMENT WITH OTHER TRADES BEFORE AND DURING CONSTRUCTION. ANY MODIFICATION TO THE EQUIPMENT LAYOUT, REQUIRED FOR INSTALLATION, IS TO BE PERFORMED UNDER THE CONTRACT AGREEMENT, AT NO ADDITIONAL COST.
5. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE EXACT LOCATION AND MOUNTING HEIGHTS OF VARIOUS EQUIPMENT. ALL SUCH EQUIPMENT AND EQUIPMENT COLORS AND FINISHES SHALL BE COORDINATED WITH THE ARCHITECT. MOUNTING HEIGHTS SHALL BE APPROVED BY THE ARCHITECT.
6. PERFORM ALL WORK IN COMPLIANCE WITH THE SPECIFICATIONS, APPLICABLE CODES, ORDINANCES AND THE REGULATORY AGENCIES HAVING JURISDICTION. THE SPECIFICATIONS MAY EXCEED THE REQUIREMENTS OF THE CODE, IN WHICH CASE, THE SPECIFICATION MUST BE FOLLOWED.
7. INSTALL ALL EQUIPMENT IN ACCESSIBLE LOCATIONS. WHERE EQUIPMENT MUST BE INSTALLED ABOVE AN INACCESSIBLE CEILING OR BEHIND A WALL, AN APPROPRIATE ACCESS DOOR SHALL BE PROVIDED AND THE LOCATION SHALL BE COORDINATED WITH THE ARCHITECT.
8. COORDINATE PIPING AND CONDUITS ENTERING OR LEAVING THE BUILDING WITH THE SITE CONTRACTOR(S) BEFORE INSTALLATION. COORDINATE INVERTS WITH THE STRUCTURE AND SYSTEM REQUIREMENTS PRIOR TO INSTALLATION.
9. WHERE A CONFLICT OCCURS BETWEEN THE DOCUMENTS, IT SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT. CARRY AS PART OF THE BID THE LARGER QUANTITY AND/OR MORE EXPENSIVE ITEM(S).
10. BEFORE INSTALLATION, COORDINATE THE WORK WITH OWNER-FURNISHED EQUIPMENT, INCLUDING REQUIRED SERVICE CONNECTIONS, FACTORY START UPS AND INSTALLATION OF FIELD DEVICES.
11. PROVIDE THE REQUIRED/SPECIFIED SLEEVES AND SEALS FOR PIPES OR CONDUIT PENETRATING INTERIOR AND EXTERIOR WALLS OR FLOOR SLABS.
12. INSTALL FLOOR-MOUNTED EQUIPMENT ON A CONCRETE HOUSEKEEPING PAD.
13. SEISMICALLY SUPPORT THE EQUPMENT AS REQUIRED BY CODE, THE AUTHORITY HAVING JURISDICTION, AND/OR AS SPECIFIED. SUBMIT ENGINEERED INSTALLATION DETAILS PER THE SPECIFICATIONS. THE CONTRACTOR'S SEISMIC ENGINEER SHALL REVIEW THE INSTALLATION AND PROVIDE A REPORT ON THE FINDINGS.
14. PROVIDE MEP COORDINATION DRAWINGS AS REQUIRED BY THE SPECIFICATIONS.
15. ENCLOSED CONTROLLERS SHALL BE PROVIDED BY THE CONTRACTOR PROVIDING THE EQUIPMENT REQUIRING AN ENCLOSED CONTROLLER. REQUIREMENTS ARE SPECIFIED UNDER DIVISION 26: "ENCLOSED CONTROLLERS". MOTOR EFFICIENCIES SHALL BE AS INDICATED IN THE SPECIFICATIONS.
16. PROVIDE PIPING, DUCTWORK, CONDUIT AND ALL OTHER ACCESSORIES AS REQUIRED FOR PROPER AND PROFESSIONAL SYSTEMS INSTALLATION.
17. TEST AND BALANCE ALL MECHANICAL AND ELECTRICAL SYSTEMS. PROVIDE ADDITIONAL TESTS AS REQUIRED BY THE SPECIFICATIONS.
18. DO NOT INSTALL PIPING OR DUCTWORK OVER ELECTRICAL PANELS, TRANSFORMERS, SPECIAL EQUIPMENT, ELEVATOR MACHINE ROOMS OR SHAFTS.
19. DO NOT INSTALL ANY SYSTEMS IN OR THROUGH ELEVATOR MACHINE ROOMS THAT DO NOT SERVE THE ROOM. MAINTAIN A MINIMUM OF SEVEN (7) FOOT HEAD CLEARANCE IN THE ELEVATOR MACHINE ROOM.
20. DO NOT INSTALL IN STAIRWELL OR STAIRWELL WALLS, PIPING, DUCTWORK, CONDUIT OR OTHER DEVICES OR EQUIPMENT NOT ASSOCIATED WITH OR SERVING THE RESPECTIVE STAIR.
21. PROVIDE PIPE EXPANSION COMPENSATION FOR THE VARIOUS PIPING SYSTEMS. SUBMIT ENGINEERED DETAILS FOR APPROVAL AND VERIFY INSTALLATION IS IN ACCORDANCE WITH CODE. THE CONTRACTOR'S CONSULTING ENGINEER SHALL REVIEW THE INSTALLATION AND PROVIDE A REPORT OF THE FINDINGS.
22. PROVIDE ADDITIONAL TRANSITIONS AND OFFSETS IN ALL PIPING, DUCTWORK OR CONDUIT FOR COORDINATION WITH BUILDING STRUCTURE AND CONSTRUCTION.
23. NO MECHANICAL OR ELECTRICAL SYSTEM COMPONENTS MAY BE SUPPORTED FROM STRUCTURAL BRACED FRAMES.

RENOVATION
1. THIS PROJECT INVOLVES THE RENOVATION OF AN EXISTING FACILITY; BEFORE SUBMITTING THE BID, CONTRACTORS SHALL VISIT THE SITE AND BECOME THOROUGHLY FAMILIAR WITH THE EXISTING CONDITIONS UNDER WHICH THE PROJECT IS TO BE COMPLETED.
2. CONTRACTORS SHALL BE HELD RESPONSIBLE FOR ASSUMPTIONS, OMISSIONS OR ERRORS MADE AS A RESULT OF FAILURE TO BECOME FULLY FAMILIAR WITH THE EXISTING CONDITIONS.
3. IT IS NOT THE INTENT OF THESE DOCUMENTS TO SHOW EVERY DEVICE, APPURTENANCE, PIPE, WIRE OR CONDUIT TO BE REMOVED. MEP EQUIPMENT, UNITS, AND SYSTEMS NOT BEING REUSED, SHALL BE REMOVED IN THEIR ENTIRETY INCLUDING ASSOCIATED HANGERS, SUPPORTS, BASES, PADS, PIPES, DUCTS, CONDUITS, WIRES, INSULATION, AND CONTROLS BACK TO THE POINT OF ORIGIN.
4. EQUIPMENT, PIPING, OR CONDUIT SHALL NOT BE ABANDONED IN-PLACE UNLESS SPECIFICALLY SO NOTED.
5. PROPERLY DISPOSE OF DEMOLISHED EQUIPMENT IN COMPLIANCE WITH CODES, REGULATIONS, AND DEEP STANDARDS. TURN OVER TO THE OWNER EQUIPMENT SO INDICATED.
6. RELOCATE EXISTING EQUIPMENT, DEVICES, PIPING, WIRING, AND RELATED SYSTEMS AS REQUIRED FOR CONSTRUCTION PURPOSES. ALL EXISTING SYSTEMS SHALL BE FULLY OPERATIONAL, INCLUDING RECONNECTION TO SERVICES AND UPGRADED SYSTEMS. ALL RELOCATED EQUIPMENT SHALL BE PROTECTED DURING CONSTRUCTION.
7. PROVIDE TEMPORARY CONNECTIONS AND SYSTEM MODIFICATIONS AS REQUIRED FOR CONSTRUCTION AND PHASING PURPOSES.
8. INCLUDE ALL WORK REQUIRED TO ALLOW PHASED CONSTRUCTION WHEN NECESSARY. COORDINATE WITH GENERAL CONTRACTOR/CONSTRUCTION MANAGER FOR PHASING REQUIREMENTS.
9. ALL EXISTING EQUIPMENT, FIXTURES, AND DEVICES TO BE REMOVED AND RELOCATED SHALL BE FIELD VERIFIED FOR EXACT QUANTITY AND CONDITION. KEEP AN ACCURATE RECORD OF STORED EQUIPMENT AND ITS CONDITION.
10. REBALANCE NEW AND EXISTING MECHANICAL AND ELECTRICAL SYSTEMS ASSOCIATED WITH THE RENOVATION, INCLUDING RENOVATED AREAS AND AREAS AFFECTED BY SYSTEM MODIFICATIONS.
11. SYSTEMS REQUIRING TO REMAIN IN OPERATION DURING DEMOLITION SHALL BE CAREFULLY PROTECTED FROM DAMAGE AND CONTAMINATION BY THE CONSTRUCTION PROCESS.

HVAC
1. PROVIDE THROTTLING VALVES AND SHUT-OFF VALVES AS SPECIFIED IN ADDITION TO THOSE INDICATED ON THE DOCUMENTS.
2. PROVIDE DUCT TAKE-OFF TYPES AND VOLUME DAMPERS PER THE SPECIFICATIONS AND DUCT TAKE-OFF DETAILS ON DRAWINGS. TAKE-OFFS SHOWN ON FLOOR PLANS DO NOT REPRESENT THE SPECIFIC TYPE OF TAKE-OFF REQUIRED. CONSULT THE DETAILS AND SPECIFICATIONS.
3. INSTALL SMOKE DETECTORS FOR AIR HANDLING EQUIPMENT PER THE MEP DETAILS.
4. PROVIDE AN AUTOMATIC TEMPERATURE CONTROL SYSTEM COMPLETE IN ALL REGARDS. ALL ZONES, VAV'S AND SYSTEMS SHALL BE THERMOSTATICALLY CONTROLLED. REVIEW THE PLANS AND SPECIFICATIONS OF ALL MEP TRADES FOR A COMPLETE SCOPE OF THE WORK.
5. PIPING SHALL BE SUPPORTED FROM STRUCTURE ABOVE. TO MAXIMIZE HEAD ROOM, INSTALL TIGHT TO BOTTOM OF BEAMS WHEN RUNNING PERPENDICULAR TO BEAM. INSTALL PIPING TIGHT TO FLOOR SLAB WHEN RUNNING PARALLEL TO BEAM. PROVIDE ALL NECESSARY FITTINGS AND TRANSITIONS.
6. PROVIDE AIR VENTS AT ALL HIGHT POINTS AND DRAINS AT ALL LOW POINTS.
7. PROVIDE FIRE DAMPERS AT DUCT PENETRATIONS OF FIRE-RATED CONSTRUCTION, INCLUDING WALLS, SHAFTS AND FLOOR PENETRATIONS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
8. PAINT AND INTERNALLY INSULATE ALL EXPOSED DUCTWORK PER THE SPECIFICATIONS.
9. PROVIDE MOTORIZED DAMPERS AT ALL PERMANENT OPENINGS (EXHAUST, SUPPLY, RELIEF, O.A. INTAKES, MAKE-UP AIR, SMOKE VENTS, ETC.) EXCEPT DRYER, KITCHEN, AND FUME EXHAUST AND PROVIDE A MEANS TO CONTROL THE DAMPER OPERATION.
10. PROVIDE DUCT LINING PER SPECIFICATIONS.

MEPT ABBREVIATIONS

A	GENERAL SERVICE COMPRESSED AIR
a	48" ABOVE FINISHED FLOOR
A/AMP	AMPERE
AC	AIR COMPRESSOR
AC	ALTERNATING CURRENT
ACD	AUTOMATIC COOLING CONDENSATE PUMP
ACF	AIRFLOW CENTRIFUGAL FAN
ACU	AIR CONDITIONING UNIT(S)
AD	ACCESS DOOR
AD	AREA DRAIN
AF	ARC FAULT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPS INTERRUPTING CURRENT
AMB	AMBIENT
ANN	ANNUNCIATOR
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APD	AIR PRESSURE DROP
APPROX	APPROXIMATE
ARV	AXIAL ROOF VENTILATOR
AS	AIR SEPARATOR
ATC	AUTOMATIC TEMPERATURE CONTROL
ATS	AUTOMATIC TRANSFER SWITCH
AV	ACID VENT (CHEMICAL)
AVG	AVERAGE
AVTR	ACID VENT THRU ROOF
AW	ACID WASTE
AWG	AMERICAN WIRE GAUGE
AWT	AVERAGE WATER TEMPERATURE
b	42" ABOVE FINISHED FLOOR
BCT	BONDING CONDUCTOR FOR TELECOMMUNICATIONS
BDD	BACK DRAFT DAMPER
BFW	BOILER FEED WATER
BHP	BRAKE HORSEPOWER
BICF	BACKWARD INCLINED CENTRIFUGAL FAN
BICSI	BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL
BNC	BAYONET NEIL-CONCELMAN
BSMT	BASEMENT
BTU	BRITISH THERMAL UNITS
BTUH	BRITISH THERMAL UNITS/HOUR
C	CONDUIT(S)
C/B	CIRCUIT BREAKER
CAT	CATEGORY ETHERNET CABLE
CATV	COMMUNITY ANTENNA TELEVISION
CC	COOLING COIL
CCTV	CLOSED CIRCUIT TELEVISION
CER/CEG	CEILING EXHAUST REG./GRILLE
CFM	CUBIC FEET PER MINUTE
CFP	CHEMICAL FEED PUMPS
CHP	CONSOLE HEAT PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CKT	CIRCUIT
CLG	CEILING
CLGWTR	COOLING WATER
CLPS	CLEAN LOW PRESSURE STEAM
CMPS	CLEAN MEDIUM PRESSURE STEAM
CMV	CEILING MOUNTED VENTILATOR
CO	CLEANOUT
CO2	CARBON DIOXIDE
COAX	COAXIAL CABLING
COMP	COMPRESSOR
COND	CONDENSER
CONV	CONVECTOR
COP	COPPER CABLING
CP	CONDENSATE PUMP
CPU	CENTRAL PROCESSING UNIT
CRU	COMPUTER ROOM UNIT
CRV	CENTRIFUGAL ROOF VENTILATOR
CT	CABLE TRAY
CT	COOLING TOWER
CT	CURRENT TRANSFORMER
CU	CONDENSING UNIT
CU FT	CUBIC FEET
CUH	CABINET UNIT HEATER
CV	COEFFICIENT, VALVE FLOW
CV	CONSTANT VOLUME
CVP	CEILING VIDEO PRESENTATION
CW	COLD WATER
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWV	CENTRIFUGAL WALL VENTILATOR
D	DATA
D	DEPTH
DA	DISTRIBUTOR A
DB	DISTRIBUTOR B
DB	DRY BULB TEMPERATURE
dB	DECIBEL
DC	DIRECT CURRENT
DC	DISTRIBUTOR C
DCV	DOUBLE CHECK VALVE
DE	DEIONIZED PROCESS WATER
DEG or °	DEGREE
DEMARC	DEMARCATION
DET	DOMESTIC EXPANSION TANK (PLUMBING)
DI	DISTILLED WATER
DIA or Ø	DIAMETER
DN	DOWN
DP	DIFFERENTIAL PRESSURE
DSA	DUCT SOUND ATTENUATORS
DWBP	DOMESTIC WATER BOOSTER PUMP
DWG	DRAWING
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EBR	ELECTRIC BASEBOARD RADIATION
EDR	EQUIVALENT DIRECT RADIATION
EF	ENTRANCE FACILITY
EF	EXHAUST FAN
EFF	EFFICIENCY
EHC	ELECTRICAL HEATING CABLES
EIA	ELECTRONICS INDUSTRIES ALLIANCE
ELEC	ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY
EM/NL	EMERGENCY/NIGHT LIGHT WALK-THRU
EMI	ELECTROMAGNETIC INTERFERENCE
EMT	ELECTRICAL METALLIC TUBING
ER	EQUIPMENT ROOM
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK (HVAC)
ETP	ELECTRIC TRAP PRIMER
EUH	ELECTRIC UNIT HEATER
EVAP	EVAPORATOR
EWB	ENTERING WET BULB TEMPERATURE
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXP	EXPANSION
F	FAHRENHEIT
FA	FIRE ALARM
FC	FOOT CANDLE
FCCF	FORWARD CURVE CENTRIFUGAL FAN
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FD	FLOOR DRAIN

MEPT ABBREVIATIONS

FD/SB	FIRE DAMPER WITH INTEGRAL SECURITY BARS
FDC	FIRE DEPARTMENT CONNECTION
FDV	FIRE DEPARTMENT VALVE
FHC	FIRE HOSE CABINET
FM	FLOW METER
FMC	FLEXIBLE METALLIC TUBING
FOB	FLAT ON BOTTOM
FOF	FUEL OIL FILL
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOT	FLAT ON TOP
FOV	FUEL OIL VENT
FP	FIRE PUMP
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOOR SINK
FT	FOOT OR FEET
FVC	FIRE VALVE CABINET
G	GAS
GA	GAUGE
GAL	GALLONS
GCC	GRAVITY COOLING CONDENSATE
GE	GROUNDING EQUALIZER
GEC	GROUNDING ELECTRODE CONDUCTOR
GF	GROUND FAULT
GND	GROUND
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GRAINS
GRU	GREASE RECOVERY UNIT
GW	GREASE WASTE
GWA	GREASE WASTE ABOVE GRADE
GWB	GREASE WASTE BURIED
GWH	GAS WATER HEATER
H	HEIGHT
H/C	HEATING/COOLING
HC	HEATING COIL
HC	HORIZONTAL CROSS-CONNECT
HD	HEAD
HDCP	HANDICAP
HP	HORSEPOWER
HPC	HIGH PRESSURE CONDENSATE
HPG	HIGH PRESSURE GAS
HPS	HIGH PRESSURE SODIUM
HPS	HIGH PRESSURE STEAM
HR	HOUR(S)
HT	HEAT
HTHW	HIGH TEMPERATURE HOT WATER
HTHWR	HIGH TEMPERATURE HOT WATER RETURN
HTHWS	HIGH TEMPERATURE HOT WATER SUPPLY
HTR	HEATER
HUM	HUMIDIFIER
HV	HEATING/VENTILATION UNIT
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HW	HOT WATER
HWR	HOT WATER RETURN
HWRP	HOT WATER RETURN PUMP
HWRR	HOT WATER REVERSE RETURN
HWS	HOT WATER SUPPLY
HX	HEAT EXCHANGER
HZ	FREQUENCY (CYCLES PER SECOND)
IC	INTERMEDIATE CROSS-CONNECT
ICF	IN-LINE CENTRIFUGAL FAN
ID	INSIDE DIAMETER
IDC	INSULATION DISPLACEMENT CONNECTOR
IEF	IN-LINE EXHAUST FAN
IG	ISOLATED GROUND
IN	INCHES
IN WG	INCHES OF WATER, GAUGE (PRESSURE)
IW	INDIRECT WASTE
JB	JUNCTION BOX
JP	JOCKEY PUMP
KEF	KITCHEN EXHAUST FAN
KHWST	KITCHEN HOT WATER STORAGE TANK
KVA	KILOVOLT AMPERE
KW	KILOWATT
KWH	KITCHEN WATER HEATER
L	LENGTH
L/LS	LOCAL SOUND SPEAKER
LA	LABORATORY COMPRESSED AIR
LAN	LOCAL AREA NETWORK
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LBS/HR	POUNDS PER HOUR
LF	LINEAR FEET
LG	LABORATORY GAS
LIQ	LIQUID
LPC	LOW PRESSURE CONDENSATE
LPS	LOW PRESSURE STEAM
LV	LABORATORY VACUUM
LVP	LOW VIDEO PRESENTATION
LWT	LEAVING WATER TEMPERATURE
MA	MEDICAL COMPRESSED AIR
MA	MILLIAMPERE
MA	MIXED AIR
MAGP	MASTER ALARM GAS PANEL
MAX	MAXIMUM
MBH	BTU PER HOUR (THOUSAND)
MC	MAIN CROSS-CONNECT
MC	METAL CLAD CABLE
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MFF	MIXED FLOW FAN
MFR	MANUFACTURER
MH	METAL HALIDE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MM	MULTI-MODE
MPC	MEDIUM PRESSURE CONDENSATE
MPS	MEDIUM PRESSURE STEAM
MUAU	MAKE UP AIR UNIT
MV	MEDICAL VACUUM
N2	NITROGEN
N2O	NITROUS OXIDE
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
N/A	NOT APPLICABLE
NEC	NATIONAL ELECTRICAL CODE
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT WALK-THRU
NTS	NOT TO SCALE
O	OXYGEN
OA	OUTSIDE AIR
OD	OUTSIDE DIAMETER
OF	OPTICAL FIBER
ORD	OVERFLOW ROOF DRAIN
ORWL	OVERFLOW RAIN WATER LEADER
P	POLE
PA	PUBLIC ADDRESS
PBX	PRIVATE BRANCH EXCHANGE
PCD	PUMPED CONDENSATE DRAIN (COOLING)
PCR	PUMPED CONDENSATE RETURN (STEAM)
PD	PRESSURE DROP
PE	PRIMARY ELECTRIC SERVICE
PF	POWER FACTOR
PF	PROPELLER FAN

MEPT ABBREVIATIONS

PH / Ø	PHASE
PIV	POST INDICATOR VALVE
PLEF	PLENUM FAN
PLUF	PLUG FAN
PNL	PANELBOARD
POE	POWER OVER ETHERNET
PP	PATCH PANEL
PR	PAIR
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
RA	RETURN AIR
RAF	RETURN AIR FAN
RD	ROOF DRAIN
RE	EXISTING EQUIPMENT TO BE DISCONNECTED AND REMOVED
REF	REFRIGERANT PIPING (MULTIPLE PIPES)
REF	ROOF EXHAUST FAN
REG	REGISTER
RF	RELIEF FAN
RGS	RIGID GALVANIZED STEEL CONDUIT
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RHG	REFRIGERANT HOT GAS
RL	EXISTING EQUIPMENT TO BE DISCONNECTED, REMOVED AND RELOCATED
RM	ROOM
RMS	ROOT MEAN SQUARED
RO	REVERSE OSMOSIS WATER
RPD	REDUCED PRESSURE DEVICE
RPM	REVOLUTIONS PER MINUTE
RTU	ROOF TOP UNIT
RU	RACK UNIT
RV	RADON VENT
RWL	RAIN WATER LEADER
S	SLEEVE(S)
S	SOIL
S&R	SUPPLY AND RETURN
SA	SUPPLY AIR
SAC	SHOP AIR COMPRESSOR
SCC	SPRINKLER CONTROL CABINET
SCP	STEAM CONDENSATE PUMP
SD	SMOKE DAMPER
SE	SECONDARY ELECTRIC SERVICE
SEP	SEWAGE EJECTOR PUMP
SG	STEAM GENERATOR
SM	SINGLE-MODE
SP	STANDPIPE
SP	STATIC PRESSURE
SP	SUMP PUMP
SPDT	SINGLE POLE DOUBLE THROW
SPEC	SPECIFICATION
SPK	SPRINKLER
SPK/SP	COMBINED SPRINKLER/ STANDPIPE
SPST	SINGLE POLE SINGLE THROW
SQ	SQUARE
SS	STAINLESS STEEL
ST	STORM
STD	STANDARD
STP	SHIELDED TWISTED PAIR
SUCT	SUCTION
SW	SWITCH
SWBD	SWITCHBOARD
SWH	STEAM WATER HEATER
T'STAT	THERMOSTAT
TAF	TUBEAXIAL FAN
TAG	IDENTIFICATION OF EQUIPMENT
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TD	TEMPERATURE DIFFERENCE
TE	TELECOMMUNICATIONS ENCLOSURE
TEBC	TELECOMMUNICATIONS EQUIPMENT BONDING CONDUCTOR
TEL	TELECOMMUNICATIONS SERVICE
TEMP	TEMPERATURE
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TMV	THERMOSTATIC MIXING VALVE
TP	TAMPERPROOF
TP	TRAP PRIMER
TR	TELECOMMUNICATIONS ROOM
TS	TELEPHONE SERVICE
TSP	TOTAL STATIC PRESSURE
TV	TELEVISION
TVS	TRANSIENT VOLTAGE SUPPRESSOR
TW	TEMPERED WATER
TWR	TEMPERED WATER RETURN
TX	TRANSFORMER
TYP	TYPICAL
UF	UNFUSED
UH	UNIT HEATER
UPF	UPBLAST PROPELLER ROOF EXHAUST FAN
UPS	UNINTERRUPTIBLE POWER SUPPLY
UR	URINAL
USF	UTILITY SET FAN
UTP	UNSHIELDED TWISTED PAIR
V	VENT
V	VOICE
V	VOLTAGE
VA	VOLT AMPERE
VAC	VACUUM
VAF	VANEAXIAL FAN
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VFC	VARIABLE FREQUENCY CONTROLLER
VIF	VERIFY IN FIELD
VOIP	VOICER OVER INTERNET PROTOCOL
VOL	VOLUME
VTR	VENT THRU ROOF
W	WALL TELEPHONE
W	WASTE
W	WATT
WAO	WORK AREA OUTLET
WAP	WIRELESS ACCESS POINT
WB	WET BULB TEMPERATURE
WC	WATER CLOSET
WEF	WALL EXHAUST FAN
WG	WIREGUARD
WH	WALL HYDRANT (HOSE BIBB)
WHA	WATER HAMMER ARRESTER
WI	WIDTH
WP	WEATHERPROOF
WPD	WATER PRESSURE DROP
WTG	WALL TRANSFER GRILLE
WTR	WATER
WV	WASTE AND VENT COMBINATION
WWM	WELDED WIRE MESH
ZVB	MEDICAL GAS ZONE VALVE BOX

GENERAL SYMBOLS

	THICK, DARK SOLID LINES INDICATE NEW OR RELOCATED ITEMS OR NEW RACEWAY AND WIRING
	THIN, LIGHT LINES INDICATE EXISTING ITEMS OR RACEWAY TO REMAIN IN PLACE AND BE REUSED
	THICK, DASHED LINES INDICATE EXISTING ITEMS TO BE REMOVED
	POINT OF NEW TO EXISTING CONNECTION, INCLUDING TRANSITIONS
EX	SUB LETTERS "EX" INDICATES EXISTING EQUIPMENT TO REMAIN INTACT
RE	SUB LETTER "RE" INDICATES EXISTING EQUIPMENT TO BE DISCONNECTED AND REMOVED
RL	SUB LETTER "RL" INDICATES EXISTING EQUIPMENT TO BE DISCONNECTED, REMOVED AND RELOCATED
NL	SUB LETTER "NL" INDICATES NEW LOCATION OF RELOCATED EQUIPMENT
NR	SUB LETTER "NR" INDICATES NEW EQUIPMENT TO REPLACE EXISTING
RR	SUB LETTER "RR" INDICATES REMOVE EQUIPMENT AND REPLACE ON NEW SURFACE
*	* = a, b, clg, AF, GF IG OR TP. WHEN TAGGED IN THE ELECTRICAL SYMBOL LIST, REFER TO THE ABBREVIATION LIST

HVAC SYMBOLS

	RECTANGULAR, FLAT OVAL OR ROUND AIR DUCT
	SUPPLY AIR DUCT UP
	SUPPLY AIR DUCT DOWN
	RETURN AIR DUCT UP
	RETURN AIR DUCT DOWN
	EXHAUST AIR DUCT UP
	EXHAUST AIR DUCT DOWN
AD	ACCESS DOOR
	FLEXIBLE DUCT CONNECTION
	CEILING SUPPLY DIFFUSERS
	CEILING RETURN / EXHAUST GRILLE
	HARD DUCTED DIFFUSER OR GRILLE WITH FULL SIZE BOTTOM TAKE-OFF
	DIRECTION OF SUPPLY OR OUTDOOR AIRFLOW
	DIRECTION OF RETURN OR EXHAUST AIRFLOW
	DOOR UNDERCUT
VD	VOLUME DAMPER
FD	FIRE DAMPER
A	VAV BOX W / UNIT TYPE
XXX	SUPPLY PIPING. REFER TO ABBREVIATION LIST FOR DESIGNATION (XXX)
XXX	RETURN PIPING. REFER TO ABBREVIATION LIST FOR DESIGNATION (XXX)
SD	SMOKE DAMPER SYSTEM AND ASSOCIATED DEVICES PER SPECIFICATIONS AND MEP DETAILS
FS	COMBINATION FIRE AND SMOKE DAMPER
M	MOTORIZED DAMPER
DS	DUCT SMOKE DETECTOR WITH REMOTE INDICATING LIGHT AND TEST SWITCH
SP	DUCT STATIC PRESSURE SENSOR
DP	DIFFERENTIAL PRESSURE SENSOR
VFC	VARIABLE FREQUENCY CONTROLLER
T	ROOM THERMOSTAT OR TEMPERATURE SENSOR
Tc	ROOM TEMPERATURE WITH CARBON DIOXIDE SENSOR
CO2	CARBON DIOXIDE SENSOR
H	HUMIDISTAT
	RADIATOR
999 999 999	VAV PERFORMANCE TAG
XXX	RADIATOR TAG

DUCT SIZING

20x12	RECTANGULAR DUCT
20Ø	ROUND DUCT
20/12	FLAT OVAL DUCT

FITTINGS AND VALVES

COLD WATER
HOT WATER
HOT WATER RECIRCULATING
PIPE ANCHOR
BACKFLOW PREVENTER
STRAINER OR STRAINER WITH BLOW-DOWN VALVE HOSE END, CAP AND CHAIN
WALL CLEANOUT OR BLIND FLANGE
"P" TRAP
PIPE TEE DOWN
IN-LINE EXPANSION COMPENSATOR
FLOOR CLEANOUT
STEEL PENETRATION / PIPE SLEEVE
PIPE ELBOW UP OR PIPE TEE UP
PIPE ELBOW DOWN
COMPANION FLANGE
PIPE CAP OR CAPPED END OF PIPE
UNION
PIPE GUIDES
PUMP
WATER HAMMER ARRESTOR
TAKEOFF FROM TOP OF MAIN PIPE
TAKEOFF FROM BOTTOM OF MAIN PIPE
DIRECTION OF FLUID FLOW
VALVE ON RISER
VALVE ON DROP
AIR VENT
PIPE DROP WITH VALVE
2-WAY CONTROL VALVE
3-WAY CONTROL VALVE
BALL VALVE
CALIBRATED BALANCING VALVE
SHUT-OFF VALVE (SEE SPECIFICATIONS FOR APPLICATION TYPE)
BUTTERFLY VALVE
CHECK VALVE
THERMOSTATIC MIXING VALVE
GLOBE VALVE
GATE VALVE
PRESSURE REDUCING VALVE
GAS COCK
TRIPLE DUTY VALVE
DRAIN VALVE WITH HOSE END, CAP & CHAIN OR WALL HYDRANT / HOSE BIBB
PRESSURE RELIEF SAFETY VALVE
AQUASTAT
SOLENOID VALVE
TEMPERATURE SENSOR WITH SEPARABLE SOCKET IN IMMERSIBLE WELL
TEMPERATURE GAUGE WITH SEPARABLE SOCKET IN IMMERSIBLE WELL
THERMOMETER WITH SEPARABLE SOCKET IN IMMERSIBLE WELL
PRESSURE GAUGE
PRESSURE SENSOR WITH SYPHON (STEAM)
FLEXIBLE CONNECTOR

CODES LISTED BELOW APPLY TO ALL PLUMBING DRAWINGS AND SPECIFICATIONS ON THIS PROJECT

- 2005 CONNECTICUT STATE BUILDING CODE WITH 2009, 2011 AND 2013 AMMENDMENTS
- 2005 CONNECTICUT STATE FIRE SAFETY CODE WITH 2009 AMMENDMENTS
- THE FOLLOWING AS REFERENCED BY THE ABOVE CODES AND AMENDMENTS:
  - 2003 INTERNATIONAL BUILDING CODE (IBC)
  - 2003 INTERNATIONAL EXISTING BUILDING CODE
  - 2003 INTERNATIONAL MECHANICAL CODE (IMC)
  - 2003 INTERNATIONAL PLUMBING CODE (IPC)
  - 2009 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
  - 2003 ICC/ANSI A117.1 - ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
  - 2007 ANSI/ASHRAE/IESNA STANDARD 90.1 - ENERGY STANDARD FOR BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS
  - 2009 INTERNATIONAL FIRE CODE (IFC)
  - 2002 ASCE/SEI 7 – MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
- 1996 ASME A17.1 SAFETY CODE FOR ELEVATORS AND ESCALATORS WITH 1997 AND 1998 ADDENDAS
- 2009 CONNECTICUT DEPARTMENT OF PUBLIC HEALTH REGULATIONS

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REVISIONS

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