NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

BID PACK No. 2

10/20/2021

573 SANBORN RD
SANBORNTON, NH

DRAWING LIST

SHEET NUMBER	DRAWING TITLE
CIVIL	
1 OF 1	EXISTING CONDITIONS PLAN
CX	NOTES
C1	TYPICAL ACCESS ROAD CROSS SECTIONS
C2	SITE LAYOUT PLAN
C3	GRADING AND UTILITY PLAN
C4	NOT USED
C5	ACCESS ROAD PROFILE
C6.1	ACCESS ROAD SECTIONS
C6.2	ACCESS ROAD SECTIONS
C7	SITE DETAILS
C8	SITE DETAILS
C9	UTILITY DETAILS
C10	SITE DETAILS
TEC1	TEMPORARY EROSION CONTROL NOTES
TEC2	TEMPORARY EROSION CONTROL DETAILS
STRUCTURAL	
S0.1	STRUCTURAL GENERAL NOTES
S1.1	FOUNDATION PLAN AND DETAILS
S2.1	FRAMING PLAN AND DETAILS
ARCHITECTURAL	
A0.1	LEGEND & GENERAL INFORMATION
A0.2	OUTLINE SPECIFICATIONS
A0.3	OUTLINE SPECIFICATIONS
A0.4	CODE REVIEW & EGRESS PLAN
A0.5	PARTITION TYPES
A1.1	FIRST FLOOR PLAN
A1.2	ROOF PLAN
A1.3	FIRST FLOOR REFLECTED CEILING PLAN
A2.1	SCHEDULES
A3.1	EXTERIOR ELEVATIONS
A4.1	ELEVATION DETAIL & BUILDING SECTIONS
A4.2	WALL SECTIONS
A5.1	SECTION DETAILS
A5.2	DOOR & WINDOW DETAILS
A5.3	WINDOW & MISCELLANEOUS DETAILS
A6.1	INTERIOR ELEVATIONS
A7.1	MISCELLANEOUS DETAILS
MECHANICAL	
M0.1	GENERAL NOTES
M1.1	FIRST FLOOR - DUCTWORK
M1.2	FIRST FLOOR - PIPING
M1.3	ATTIC - DUCTWORK
M3.1	DETAILS - BOLIER
M3.2	DETAILS
M3.3	DETAILS
M3.4	DETAILS - VRF
M4.1	SCHEDULES
M4.2	SCHEDULES
M5.1	SPECIFICATIONS
M5.2	SPECIFICATIONS
M5.3	SPECIFICATIONS
M5.4	SPECIFICATIONS

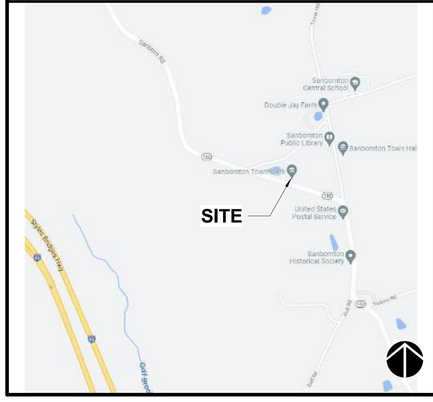
DRAWING LIST

SHEET NUMBER	DRAWING TITLE
M5.5	SPECIFICATIONS
M5.6	SPECIFICATIONS
M5.7	SPECIFICATIONS
M5.8	SPECIFICATIONS
M5.9	SPECIFICATIONS
M5.10	SPECIFICATIONS
PLUMBING	
P0.1	GENERAL NOTES
P0.2	SCHEDULES
P1.1	FIRST FLOOR - DOMESTIC HOT AND COLD
P1.2	FIRST FLOOR - SANITARY AND VENT
P3.1	DETAILS
P5.1	SPECIFICATIONS
P5.2	SPECIFICATIONS
P5.3	SPECIFICATIONS
P5.4	SPECIFICATIONS
P5.5	SPECIFICATIONS
P5.6	SPECIFICATIONS
ELECTRICAL	
E0.1	ELECTRICAL LEGEND AND NOTES
E0.2	ELECTRICAL SPECIFICATIONS
E0.3	ELECTRICAL SCHEDULES AND ONE-LINE DIAGRAM
E0.4	ELECTRICAL DETAILS
E0.5	ELECTRICAL DETAILS
E1.0	ELECTRICAL LIGHTING PLAN
E2.0	ELECTRICAL POWER PLAN
FA0.1	FIRE ALARM LEGEND, NOTES, RISERS AND SPECIFICATIONS
FA1.0	FIRE ALARM FLOOR PLAN

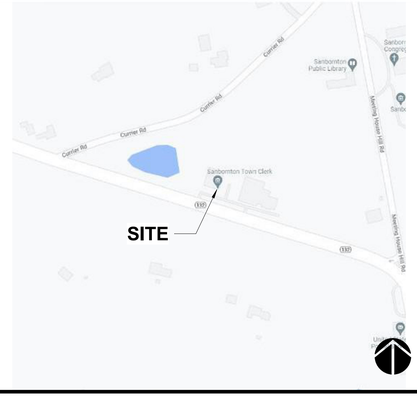
PROJECT NUMBER: 5175

COVER SHEET COVER

LOCUS MAP 1



LOCUS MAP 2



DESIGNED AND ENGINEERED BY:

TURNER GROUP

The H.L. Turner Group Inc.
27 Locke Rd.
Concord, New Hampshire 03301
t:603.228.1122
hlturner.com
ARCHITECTS• ENGINEERS • BUILDING SCIENTISTS

BLW ENGINEERS
311 Great Road
Littleton, MA 01460
t: 978.486.4301
e-mail: info@blwengineers.com
ELECTRICAL * PLUMBING * FIRE PROTECTION

CIVIL ENGINEERING	THE HL TURNER GROUP INC.	T:603.622.5533	F:603.622.4740
STRUCTURAL ENGINEERING	THE HL TURNER GROUP INC.	T:603.228.1122	F:603.228.1124
ARCHITECTURAL	THE HL TURNER GROUP INC.		
MECHANICAL ENGINEERING	TURNER BUILDING SCIENCE, LLC.	T:207.583.4571	F:207.583.4572
PLUMBING ENGINEERING	TURNER BUILDING SCIENCE, LLC.		
ELECTRICAL ENGINEERING	BLW ENGINEERS, INC.	T:978.486.4301	F:978.428.0067

BUILDING DESIGN CRITERIA:

SEE SHEET A0.4 - CODE ANALYSIS

CONSTRUCTED BY:

BPS Bonnette, Page & Stone

BONNETTE, PAGE & STONE
91 Bisson Avenue
Laconia, NH 03246
Phone 603-524-3411
Fax 603-524-4641

ARCHITECT OF RECORD:

RICHARD D. PROCTOR, AIA
HL TURNER GROUP, INC.

10/25/2021 9:49:10 AM

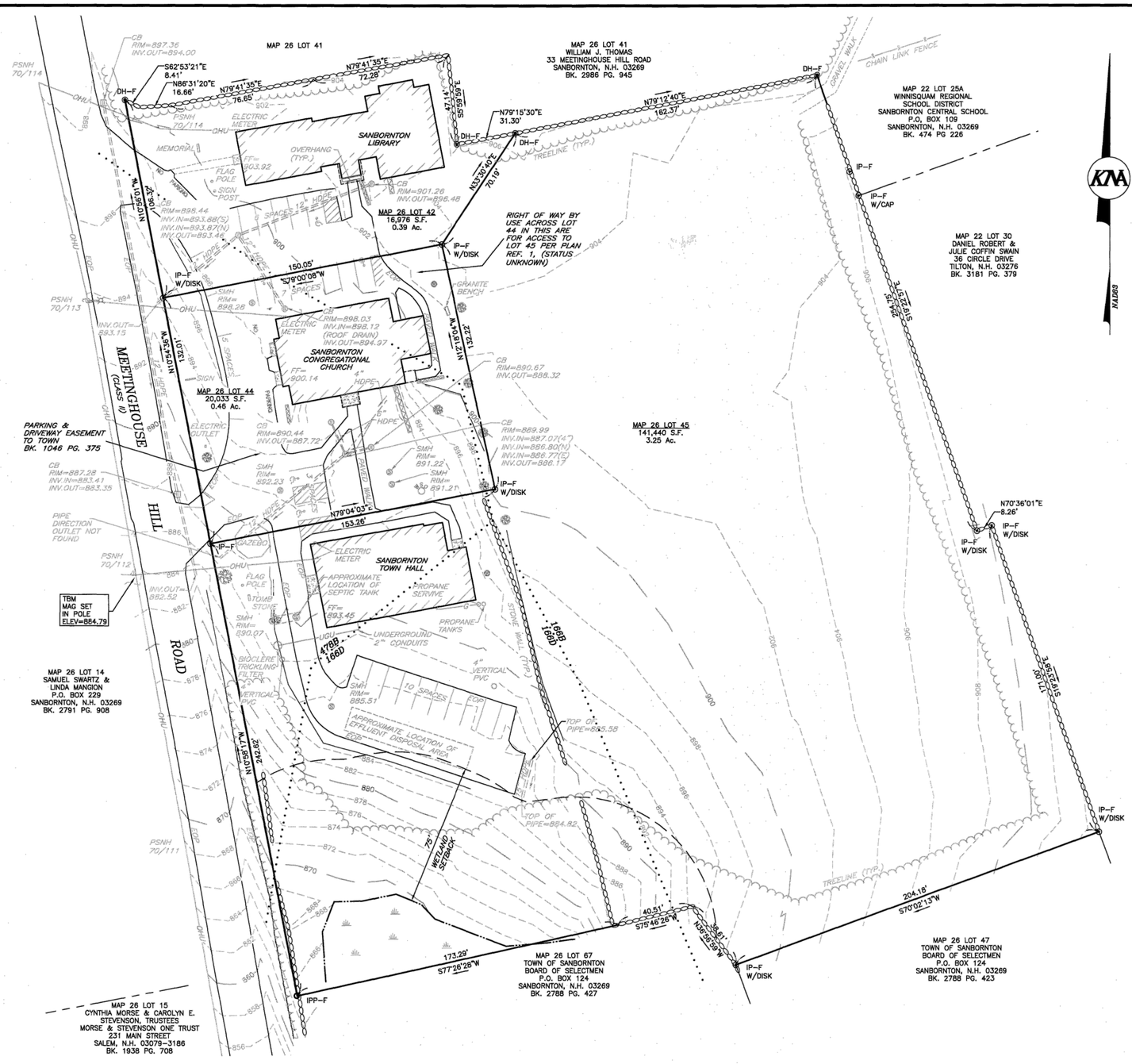
LEGEND

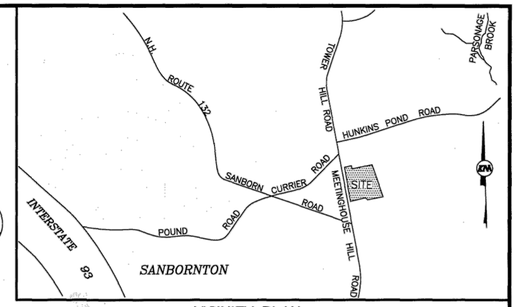
○ IPP–F	IRON PIPE FOUND
⊙ IP–F	IRON PIN FOUND
◉ DH–F	DRILL HOLE FOUND
	UTILITY POLE
	STREET LIGHT
	SIGN
	WATER SHUT OFF
	SEWER MANHOLE
	CATCH BASIN
	ROUND CATCH BASIN
	ABUTTER LINE
	PROPERTY LINE
	RIGHT OF WAY LINE
OHU	OVERHEAD UTILITIES
UGU	UNDERGROUND UTILITIES
G G	GAS LINE
	WETLAND
X X	CHAIN LINK FENCE
	DRAINAGE LINE
	RETAINING WALL
EOP	EDGE OF PAVEMENT
	10' CONTOUR
	2' CONTOUR
	SOIL LINE
	WETLAND SETBACK
	TREE

SCS SOILS LEGEND

166B	CANTERBURY FINE SANDY LOAM 3 TO 8 PERCENT SLOPES
166D	CANTERBURY FINE SANDY LOAM 15 TO 25 PERCENT SLOPES
478B	GILMANTON FINE SANDY LOAM 3 TO 8 PERCENT SLOPES

SOURCE: USDA–SCS WEB SOIL SURVEY BELKNAP COUNTY





VICINITY PLAN
SCALE: 1" = 1000'

NOTES:

1. THE PURPOSE OF THIS PLAN IS TO DEPICT THE EXISTING CONDITIONS PRESENT ON MAP 26 LOTS 42, 44 & 45 IN THE TOWN OF SANBORNTON, NEW HAMPSHIRE AS SHOWN HEREON.
2. EXISTING AREA OF PARCELS:

LOT 42:	16,976 S.F.	0.39 ACRES
LOT 44:	20,033 S.F.	0.46 ACRES
LOT 45:	141,440 S.F.	3.25 ACRES

3. THE SUBJECT PARCELS ARE LOCATED ENTIRELY WITHIN THE HISTORICAL PRESERVATION (H.P.) ZONING DISTRICT.
4. THERE ARE NO REQUIRED SETBACKS.
5. TOPOGRAPHIC AND BOUNDARY INFORMATION SHOWN HEREON ARE BASED ON AN ACTUAL FIELD SURVEY MADE BY THIS OFFICE DURING SEPTEMBER OF 2021.
6. THE HORIZONTAL DATUM OF NAD83 AND THE VERTICAL DATUM OF NAVD88 WERE OBTAINED BY GPS SURVEY AND BASED UPON NHDOT CONTROL DISK 343–0040.
7. EXAMINATION OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) FOR THE TOWN OF SANBORNTON N.H., BELKNAP COUNTY, MAP NUMBER 33000800010020, EFFECTIVE DATE: JUNE 15, 1979 INDICATES THAT NO PORTION OF THE SUBJECT PARCEL IS LOCATED WITHIN A DESIGNATED FLOOD HAZARD AREA.
8. THE LOCATION OF ANY UNDERGROUND UTILITY INFORMATION SHOWN HEREON IS APPROXIMATE. KEACH–NORDSTROM ASSOCIATES, INC. MAKES NO CLAIM TO THE ACCURACY OR COMPLETENESS OF THE UTILITIES SHOWN. PRIOR TO ANY EXCAVATION ON SITE THE CONTRACTOR OR OWNER SHALL CONTACT DIG–SAFE AT 811.
9. EASEMENTS, RIGHTS AND RESTRICTIONS SHOWN OR IDENTIFIED HEREON ARE THOSE FOUND DURING RESEARCH AT THE BELKNAP COUNTY REGISTRY OF DEEDS. OTHER EASEMENTS, RIGHTS AND RESTRICTIONS MAY EXIST WHICH A TITLE EXAMINATION OF THE SUBJECT PREMISES MAY DETERMINE.
10. LOT 44 IS SUBJECT TO A PARKING AND DRIVEWAY EASEMENT BENEFITING THE TOWN OF SANBORNTON PER BOOK 1046 PAGE 375.
11. PER PLAN REF. 1, LOT 44 MAY BE SUBJECT TO A RIGHT OF WAY BY USE BENEFITING LOT 45 (NO WRITTEN EASEMENT FOUND, STATUS UNKNOWN)

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

EXISTING CONDITIONS PLAN
MEETINGHOUSE HILL ROAD
MAP 26 LOTS 42, 44 & 45
MEETINGHOUSE HILL ROAD
SANBORNTON, NEW HAMPSHIRE
BELKNAP COUNTY

OWNER OF RECORD:

LOT 42	LOT 44	LOT 45
TOWN OF SANBORNTON	SANBORNTON CONGREGATIONAL CHURCH	TOWN OF SANBORNTON
P.O. BOX 88	P.O. BOX 126	P.O. BOX 124
SANBORNTON, N.H.	SANBORNTON, N.H.	SANBORNTON, N.H.
BK. 125 PG. 194	BK. 176 PG. 325	BK. 1945 PG. 424
BK. 2531 PG. 1001		BK. 2430 PG. 747
BK. 2430 PG. 744		
BK. 2984 PG. 636		

APPLICANT:
HL TURNER GROUP, INC.
27 LOCKE ROAD
CONCORD, N.H.

KEACH–NORDSTROM ASSOCIATES, INC.
Civil Engineering Land Surveying Landscape Architecture
10 Commerce Park North, Suite 3B, Bedford, NH 03110 Phone (603) 627–2881

DIG SAFE
811 CALL ONE CALL
UTILITIES UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM

UTILITY NOTE

THE UNDERGROUND UTILITIES DEPICTED HEREON HAVE BEEN DRAWN FROM FIELD SURVEY INFORMATION AND OR PLOTTED FROM EXISTING DRAWINGS. KEACH–NORDSTROM ASSOCIATES, INC. MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER, KEACH–NORDSTROM ASSOCIATES, INC. DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. KEACH–NORDSTROM ASSOCIATES, INC. HAS NOT PHYSICALLY LOCATED THE UNDERGROUND PORTIONS OF THE UTILITIES.

REFERENCE PLANS

1. "BOUNDARY–LINE ADJUSTMENT PLAN" BETWEEN PROPERTIES OF RICHARD SPINNER, SANBORNTON TOWN LIBRARY, SANBORNTON CONGREGATIONAL CHURCH, AND ROBERT & PRISCILLA BODWELL & M. ELAINE MITCHELL. MEETINGHOUSE HILL ROAD, SANBORNTON, N.H. SCALE: 1"=30'. DATED: AUGUST 25, 2005. PREPARED BY: H.E. BERGERON ENGINEERS, INC.
2. "SEWAGE DISPOSAL SYSTEM PLAN" OF THE SANBORNTON SQUARE. SANBORNTON, N.H. SCALE: 1"=20'. DATED: AUGUST 26 ,2005. PREPARED BY: H.E. BERGERON ENGINEERS, INC.
3. "BOUNDARY–LINE ADJUSTMENT PLAN" BETWEEN LANDS OF ROBERT M. & PRISCILLA A. BODWELL & M. ELAINE MITCHELL AND THE TOWN OF SANBORNTON, N.H. SCALE: 1"=40' DATED: JUNE 28, 2007. PREPARED BY: H.E. BERGER ENGINEERS, INC.

STATE OF NEW HAMPSHIRE
JOSHUA M. BRIEN
10/5/2021
No. 256
CERTIFIED WETLAND SCIENTIST

WETLAND SCIENTIST'S CERTIFICATION:

JOSHUA BRIEN, CERTIFIED WETLAND SCIENTIST #256 OF KEACH–NORDSTROM ASSOCIATES, INC. OF BEDFORD, NH PERFORMED THE DELINEATION OF JURISDICTIONAL WETLANDS ON SEPTEMBER 10, 2021 USING THE TECHNICAL CRITERIA IN THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL (TECHNICAL REPORT Y–87–1, JANUARY 1987).

CERTIFIED WETLAND SCIENTIST — DATE 10/5/2021

SURVEYOR'S CERTIFICATION:

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR THOSE UNDER MY DIRECT SUPERVISION. FURTHER, THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY MADE BY THIS OFFICE DURING SEPTEMBER OF 2021. SAID SURVEY HAS A RELATIVE ERROR OF CLOSURE OF ONE PART IN TEN THOUSAND (1:10,000) OR BETTER.

LICENSED LAND SURVEYOR — DATE 10/5/21

STATE OF NEW HAMPSHIRE — No. 911 — CHRISTOPHER MICKEY — LICENSED LAND SURVEYOR

REVISIONS

No.	DATE	DESCRIPTION	BY

DATE: OCTOBER 5, 2021	SCALE: 1"=30'
PROJECT NO: 21–0824–2	SHEET 1 OF 1

LEGEND

ENGINEERING

PROPOSED	EXISTING	DESCRIPTION
212	212	CONTOUR INTERVALS
212.3	X 212.3	SPOT ELEVATIONS
R=5'		LENGTH OF RADIUS DESCRIPTION

BOUNDARIES

PROPOSED	EXISTING	DESCRIPTION
		PROPERTY LINES
		SETBACK LINE
		RIGHT-OF-WAY
EOP		EDGE OF PAVEMENT
		EDGE OF GRAVEL
		VERTICAL GRANITE CURBING
		STONE WALL
		CHAIN LINK FENCE
		HANDRAIL
		IRON PIPE OR REBAR
		GRANITE OR CONCRETE BOUND
	CG / RS	ZONING BOUNDARY
		EDGE OF WATER
		NCRC SOILS BOUNDARY
	300B	ZONING BOUNDARY

UTILITIES

PROPOSED	EXISTING	DESCRIPTION
		UTILITY POLE
		CATCH BASIN
S	S	SEWER MANHOLE
D	D	DRAIN MANHOLE
		SUBMERSIBLE PUMP STATION
		MONITORING WELL
		WATER SHUTOFF
	GV	GAS SHUTOFF
		FIRE HYDRANT
		UTILITY POLE WITH LIGHT
D	D	DRAIN LINE
S	S	SEWER LINE
FD		FOUNDATION DRAIN
SD		SURFACE DRAIN
W	W	WATER LINE
G	G	GAS LINE
OHE	OH	OVERHEAD UTILITY LINE
UHE	E	UNDERGROUND ELECTRIC LINE
		SITE LIGHT FIXTURES
		WALL MOUNTED LIGHT

EROSION CONTROL

PROPOSED	EXISTING	DESCRIPTION
		SILTATION FENCING/BERM
		CONSTRUCTION FENCING

DIG SAFE
MA - ME - NH - RI - VT
1-888-344-7233
1-888-DIG-SAFE

GENERAL CULTURE

PROPOSED	EXISTING	DESCRIPTION
		TREES
		TREELINE
		SIGNS & SYMBOLS
		CONCRETE FILLED STEEL BOLLARD
4		PARKING SPACE COUNT
R		REMOVE
A		ABANDON IN PLACE
RR		REMOVE AND RESET
RS		REMOVE AND SALVAGE TO OWNER
PM		PROTECT AND MAINTAIN
RP		REMOVE PAVEMENT
SP		SAWCUT PAVEMENT
	B1	SUBSURFACE BORING
	TP1	TEST PIT
	E	ELECTRIC BOX
		POST
1 / C4 — TYPICAL SECTION NUMBER; SHEET LOCATION OF TYPICAL SECTION		SURFACE TREATMENT
5 / C3.3 — PLAN NUMBER; SHEET LOCATION OF ENLARGED PLAN		ENLARGED PLAN
18 / C7.1 — CROSS-SECTION NUMBER; SHEET WHERE CROSS-SECTION IS SHOWN		CROSS-SECTION
1 / C7 C2 — DETAIL NUMBER; SHEET SERIES WHERE DETAIL IS SHOWN; SHEET WHERE DETAIL IS SHOWN		DETAIL

ABBREVIATIONS

General

ABAN	Abandon
ACR	Accessible Curb Ramp
ADJ	Adjust
APPROX	Approximate
BC	Bituminous Curb
BOS	Bottom Of Slope
CCB	Cape Cod Berm
ELEV	Elevation
EXIST	Existing
FDN	Foundation
MAX	Maximum
MIN	Minimum
NIC	Not In Contract
NTS	Not To Scale
PCC	Precast Concrete Curb
PROP	Proposed
PSI	Pounds Per Square Inch
RAP	Reclaimed Asphalt Pavement
R&R	Remove And Reset
R&S	Remove And Stack
REM	Remove
REMOD	Remodel
RET	Retain
SDYL	Silod Double Yellow Line
SGC	Sloped Granite Curb
SP	Sawcut Pavement
SSWL	Single Solid White Line
TOS	Top Of Slope
TOW	Top Of Wall
TYP	Typical
UNO	Unless Noted Otherwise
VGC	Vertical Granite Curb
VIF	Verify In Field

Landscaping

B&B	Balled & Burlapped
BR	Bare Root
L&S	Loam And Seed

Utility

ACCMP	Asphalt Coated Corrugated Metal Pipe
AD	Acid Resistant
CAP	Corrugated Aluminum Pipe
CB	Catch Basin
CIP	Cast Iron Pipe
CIT	Change In Type
CMP	Corrugated Metal Pipe
COND	Conduit
DIP	Ductile Iron Pipe
DMH	Drain Manhole
F&C	Frame And Cover
F&G	Frame And Grate
HDPE	High Density Polyethylene Pipe
HYD	Hydrant
INV	Invert Elevation
PE	Polyethylene Pipe
PPE	Polypropylene Pipe
PPS	Prefabricated Pump Station
PVC	Polyvinylchloride Pipe
PWW	Paved Water Way
RCP	Reinforced Concrete Pipe
RGS	Rigid Galvanized Steel
SD	Surface Drain
SMH	Sewer Manhole
TSV&B	Tapping Sleeve, Valve & Box
UD	Underdrain
UP	Utility Pole
VCP	Vitrified Clay Pipe
XP	Explosion Proof

SURVEY NOTES

1. SURVEY BY KEACH-NORDSTROM ASSOCIATES, ON OCTOBER 5, 2021 FOR THE H.L. TURNER GROUP INC.
2. THE ENGINEER MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. CONTRACTOR SHOULD NOTIFY, IN WRITING, ANY UTILITY COMPANY AND APPROPRIATE GOVERNMENTAL AGENCIES PRIOR TO ANY EXCAVATION WORK AND CALL DIG-SAFE AT 1-888-344-7233.

GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR THE MEANS AND METHODS OF CONSTRUCTION AND FOR CONDITIONS AT THE SITE. THESE PLANS, PREPARED BY THE H.L. TURNER GROUP INC., DO NOT EXTEND TO OR INCLUDE SYSTEMS PERTAINING TO THE SAFETY OF THE CONSTRUCTION CONTRACTOR OR HIS EMPLOYEES, AGENTS OR REPRESENTATIVES IN THE PERFORMANCE OF THE WORK. THE SEAL OF THE ARCHITECT OR ENGINEER HEREON DOES NOT EXTEND TO ANY SUCH SAFETY SYSTEMS THAT MAY NOW OR HEREAFTER BE INCORPORATED INTO THESE PLANS. THE CONSTRUCTION CONTRACTOR SHALL PREPARE OR OBTAIN THE APPROPRIATE SAFETY SYSTEMS THAT MAY BE REQUIRED BY THE U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND/OR LOCAL REGULATIONS.
2. THIS PROJECT IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING: A.) THE LATEST EDITION OF THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AND ALL SUPPLEMENTS. B.) STORMWATER MANUAL VOLUMES 1-3 BY THE NH DEPT. OF ENVIRONMENTAL SERVICES. C.) THE LATEST EDITION OF THE TOWN OF SANBORNTON CONSTRUCTION STANDARDS.
3. CONTRACTOR SHALL PROTECT AND MAINTAIN EXISTING BENCHMARKS AND BOUNDS. ALL BENCHMARKS AND BOUNDS DISTURBED BY THE CONTRACTOR, WHETHER THEY BE PRIVATE PROPERTY CORNERS OR HIGHWAY RIGHT OF WAY BOUNDS, SHALL BE REESTABLISHED BY A NEW HAMPSHIRE LICENSED LAND SURVEYOR AT NO EXPENSE TO THE TOWN OF SANBORNTON OR ABUTTING PROPERTY OWNERS.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL PERMITS, FEES, TEMPORARY UTILITIES AND COORDINATION WITH ALL AGENCIES IN OBTAINING ACCESS TO THE SITE AND PERFORMING ALL WORK REQUIRED FOR THIS PROJECT.
5. THIS WORK SHALL BE CONSTRUCTED FROM A COMPLETE SET OF PLANS AND SPECIFICATIONS.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION AND PROVISION OF ALL TRAFFIC AND PEDESTRIAN CONTROL AND SAFETY FOR THE DURATION OF THIS PROJECT.
7. VERIFY TBM ELEVATIONS PRIOR TO CONSTRUCTION.

GENERAL CONSTRUCTION SEQUENCE NOTES

1. THE FOLLOWING IS THE ENGINEER'S RECOMMENDED CONSTRUCTION SEQUENCE. THE CONTRACTOR SHALL SUBMIT A DETAILED PROJECT SCHEDULE TO THE OWNER AND ENGINEER PRIOR TO THE COMMENCEMENT OF WORK. PROJECT SCHEDULE IS ULTIMATELY THE CONTRACTOR'S RESPONSIBILITY.
2. INSTALL SILT FENCING AND OTHER FILTRATION BARRIERS, INLET PROTECTION, STABILIZED CONSTRUCTION EXIT(S), AND EROSION PREVENTION MEASURES PRIOR TO THE START OF ANY EARTH MOVING OPERATION; MEASURES ARE TO BE MAINTAINED UNTIL FINAL PAVEMENT SURFACING AND LANDSCAPING AREAS ARE ESTABLISHED.
3. DELINEATE CONSTRUCTION LIMITS.
4. STRIP AND STOCKPILE LOAM AND EXCESS EARTH MATERIAL TO BE SAVED. STABILIZE STOCKPILE(S) AS NECESSARY. COORDINATE STAGING AND STOCKPILE LOCATIONS WITH THE TOWN OF SANBORNTON.
5. PRIOR TO COMMENCING ROUGH GRADING, CONSTRUCT AND STABILIZE TEMPORARY DETENTION PONDS, SWALES, AND OTHER STORMWATER CONVEYANCES. ENSURE THE SOIL IN THESE DISTURBED AREAS IS STABILIZED PRIOR TO DIRECTING RUNOFF OR STORMWATER DISCHARGES INTO AND THROUGH THE MEASURES.
6. PREPARE FOUNDATION AND PREPARE BUILDING PAD FOR NEW SLAB.
7. INSTALL UNDERSLAB UTILITIES.
8. EXCAVATE AND INSTALL SITE UTILITIES OUTSIDE OF BUILDING FOOTPRINT.
9. CONSTRUCT BUILDING.
10. ROUGH GRADE SIDEWALKS AND SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THE GRADING ALLOWS SURFACE RUN-OFF TO FLOW FROM UNSTABILIZED AREAS TOWARDS STABILIZED AREAS AND TOWARD THE PROTECTIVE MEASURES FOR SEDIMENT RETENTION.
11. PERFORM FINE GRADING ACROSS SITE. PLACE PAVEMENTS AND HARDSCAPING AND ENSURE ALL DISTURBED AREAS OUTSIDE OF PAVEMENT ARE LOAMED, SEEDED AND STABILIZED.
12. AFTER ALL AREAS HAVE BEEN STABILIZED, REMOVE ALL ACCUMULATED SEDIMENTS, FINISH GRADE, RESEED, AND APPLY HAY OR STRAW MULCH. REMOVE TEMPORARY SEDIMENTATION BASINS AND SWALES. COMPLETE FINISH GRADING AND STABILIZATION OF DISTURBED AREAS.
13. FINISH ANY REMAINING SITE CONSTRUCTION.
14. REMOVE SILT FENCE, STONE, AND OTHER TEMPORARY EROSION CONTROL MEASURES AFTER VEGETATION IS ESTABLISHED, SILT FENCING IS TO BE CUT-OFF AT GROUND LEVEL, SO AS NOT TO DESTABILIZE THE TERRAIN DURING REMOVAL. IF THE GROUND DOES BECOME DESTABILIZED, RELOAM AND SEED. STUMP GRINDING BERMS SHALL BE REMOVED AND DISPOSED OF OFFSITE. RAKE OUT ALL REMAINING DEBRIS. PERFORM FINAL SITE CLEAN-UP.
15. CLEAN ALL DRAINAGE STRUCTURES, PIPES, SUMPS, SWALES, AND BASINS OF ALL SILT AND DEBRIS.

SITE NOTES

1. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE THEMSELVES WITH THE SITE AND ALL EXISTING CONDITIONS SURROUNDING IT AND THEREON. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF THEIR INTENTION TO ACCESS THE SITE AT LEAST 48 HOURS IN ADVANCE.
2. LIMITS OF WORK ARE SHOWN AS APPROXIMATE. THE CONTRACTOR SHALL COORDINATE ALL WORK TO PROVIDE SMOOTH TRANSITIONS. THIS INCLUDES GRADING, PAVEMENT, CURBING, SIDEWALKS AND ALIGNMENTS.
3. THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES, SPECIFICATIONS, REGULATIONS AND STANDARDS.
4. ALL EXCAVATIONS SHALL BE THOROUGHLY SECURED ON A DAILY BASIS BY THE CONTRACTOR AT THE COMPLETION OF CONSTRUCTION OPERATIONS.
5. THE ENGINEER SHALL BE CONTACTED FOR CLARIFICATION OF SITE WORK AND/OR GRADING, IF NECESSARY.
6. THE CONTRACTOR SHALL MAINTAIN EMERGENCY ACCESS TO ALL AREAS AFFECTED BY THEIR WORK AT ALL TIMES.
7. EXTERIOR DIMENSIONS ARE TO THE FACE OF BUILDING UNLESS NOTED OTHERWISE.
8. WRITTEN DIMENSIONS HAVE PRECEDENCE OVER SCALED DIMENSIONS. THE CONTRACTOR SHALL USE CAUTION WHEN SCALING REPRODUCED PLANS. IN CASE OF CONFLICT BETWEEN THIS PLAN SET AND ANY OTHER DRAWING AND/OR SPECIFICATION, THE ENGINEER SHALL BE CONTACTED IMMEDIATELY FOR CLARIFICATIONS.
9. SITE WORK SHALL BE CONSTRUCTED FROM A COMPLETE SET OF PLANS; NOT ALL FEATURES ARE DETAILED ON EVERY PLAN. THE ENGINEER IS TO BE NOTIFIED OF ANY CONFLICT WITHIN THIS PLAN SET.
10. EXISTING VEGETATION IS TO REMAIN UNDISTURBED WHEREVER POSSIBLE.
11. THE AREA OF LAND EXPOSED AND THE TIME OF EXPOSURE SHALL BE MINIMIZED. ALL DISTURBED AREAS SHALL BE STABILIZED WITHIN 72 HOURS AFTER FINAL GRADING. HOWEVER, WORK IN ADDITIONAL SUB PHASES MAY BE PERFORMED IF NEEDED FOR RELATED UTILITY EXTENSIONS/ CONNECTIONS OR EARTHWORK BORROW/FILL, BUT IN ALL CASES BE STABILIZED WITHIN 72 HOURS AFTER UTILITIES ARE IN PLACE OR EARTHWORK OPERATIONS CEASE. IN NO CASE SHALL ANY DISTURBED AREA BE LEFT UNSTABILIZED WITHOUT EITHER PERMANENT OR TEMPORARY EROSION CONTROL MEASURES FOR MORE THAN 24 HOURS OR AS NEEDED TO ENSURE SUFFICIENT STABILIZATION DUE TO WEATHER OR OTHER CONDITIONS. SIMULTANEOUS WORK IN MULTIPLE PHASES MAY BE PERMITTED AS NEEDED, SUBJECT TO THE ABOVE CRITERIA. HOWEVER, THE CONTRACTOR SHALL NOT DISTURB AREAS THAT CANNOT REASONABLY BE PROPERLY STABILIZED AND MAINTAINED WITHIN 72 HOURS.
12. TOPSOIL STRIPPED FROM THE SITE SHALL BE STOCKPILED IN A LOCATION APPROVED BY THE OWNER. ALL TOPSOIL SHALL REMAIN THE PROPERTY OF THE OWNER.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY DAMAGE THAT HAS OCCURRED TO EXISTING WALKWAYS, UTILITIES, BUILDINGS, STRUCTURES, ETC., AS A RESULT OF HIS ACTIVITIES. REPAIRS ARE TO BE PERFORMED AT NO COST TO THE OWNER AND TO THE SATISFACTION OF THE ENGINEER AND THE OWNER.

UTILITY NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND DETERMINING THE LOCATION, SIZE, AND ELEVATION OF ALL EXISTING UTILITIES, SHOWN OR NOT SHOWN ON THESE PLANS PRIOR TO THE START OF ANY CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY UTILITIES FOUND INTERFERING WITH THE PROPOSED CONSTRUCTION AND APPROPRIATE REMEDIAL ACTION SHALL BE AGREED TO BY THE ENGINEER BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTACT "DIGSAFE" (888) 344-7233 AT LEAST 72 HOURS NOT INCLUDING WEEKENDS AND HOLIDAYS PRIOR TO INITIATING CONSTRUCTION ACTIVITIES ON THE SITE. THE CONTRACTOR IS ADVISED THAT DIGSAFE MAY NOT LOCATE UTILITIES OFF THE PUBLIC RIGHT-OF-WAY WHICH MAYBE PRESENT AT THIS SITE.
2. THE CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES OWNING UTILITIES, EITHER OVERHEAD OR UNDERGROUND, WITHIN THE CONSTRUCTION AREA AND SHALL COORDINATE WITH THE UTILITY COMPANIES. THE PROTECTION OR RELOCATION OF UTILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
3. PROPOSED RIM ELEVATIONS OF DRAINAGE STRUCTURES ARE APPROXIMATE. FINAL ELEVATIONS ARE TO BE SET FLUSH WITH FINISH GRADES UNLESS NOTED OTHERWISE. ADJUST ALL OTHER RIM ELEVATIONS OF MANHOLES, WATER GATES, AND OTHER UTILITIES TO FINISHED GRADE WITHIN LIMITS OF WORK.
4. IF APPLICABLE, THE CONTRACTOR SHALL COORDINATE WITH THE RESPECTIVE UTILITY AGENCY PRIOR TO DISCONNECTING THE EXISTING SERVICE CONNECTIONS AT THEIR RESPECTIVE MAINS. THE EXISTING UTILITIES SHALL BE DISCONNECTED IN ACCORDANCE WITH THE RESPECTIVE UTILITY COMPANIES' STANDARDS AND SPECIFICATIONS.
5. ALL DRAINAGE STRUCTURES INTERIOR DIAMETERS (4' MINIMUM UNLESS OTHERWISE NOTED) SHALL BE DETERMINED BY THE MANUFACTURER BASED ON THE PIPE CONFIGURATIONS SHOWN ON THESE PLANS. CATCH BASINS SHALL HAVE 3-FOOT DEEP SUMPS, UNLESS OTHERWISE NOTED. CONTRACTOR SHALL EXCAVATE TEST PITS AT ALL EXISTING UTILITY CROSSINGS TO VERIFY PIPE SIZE AND ELEVATION PRIOR TO COMMENCING UTILITY CONSTRUCTION.

LANDSCAPE NOTES

1. LANDSCAPE PLAN (SHEET C5) NOT INCLUDED.
2. REPLANTING OF SALVAGED LANDSCAPING TO BE COORDINATED WITH TOWN OF SANBORNTON.

TURNER GROUP

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TOWN OF SANBORNTON ★ GRANTED 1748 INCORPORATED 1770

PROJECT TITLE / ADDRESS:
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TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

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DESN. BY:	JAB	
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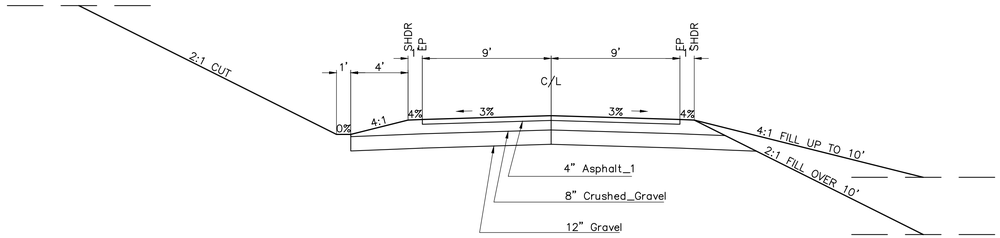
ISSUE DATE:	10/22/2021	

REVISIONS

SHEET TITLE:
NOTES

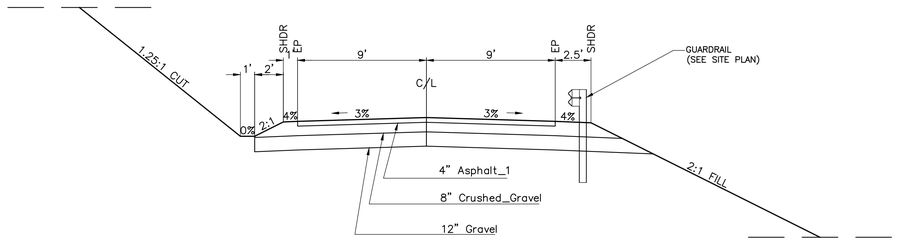
CX



TYPICAL 9 FT. ACCESS ROAD CROSS SECTION

SCALE: 1"=5'

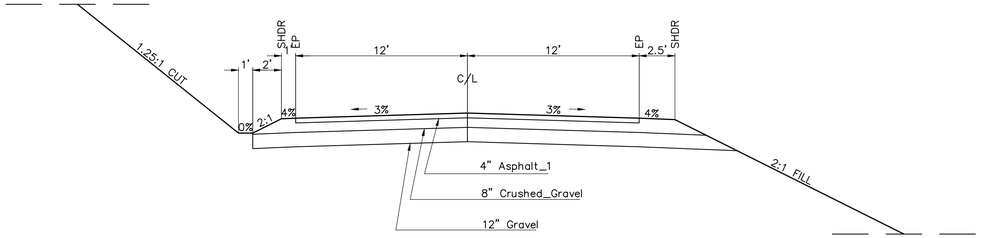
STA. 202+10 TO STA. 203+66.5



TYPICAL 9 FT. ACCESS ROAD CROSS SECTION

SCALE: 1"=5'

12 FT. TO 9 FT. ROADWAY TRANSITION:
STA. 200+54 TO STA. 201+04



TYPICAL 12 FT. ACCESS ROAD CROSS SECTION

SCALE: 1"=5'

STA. 200+30 TO STA. 200+54

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SHEET TITLE:

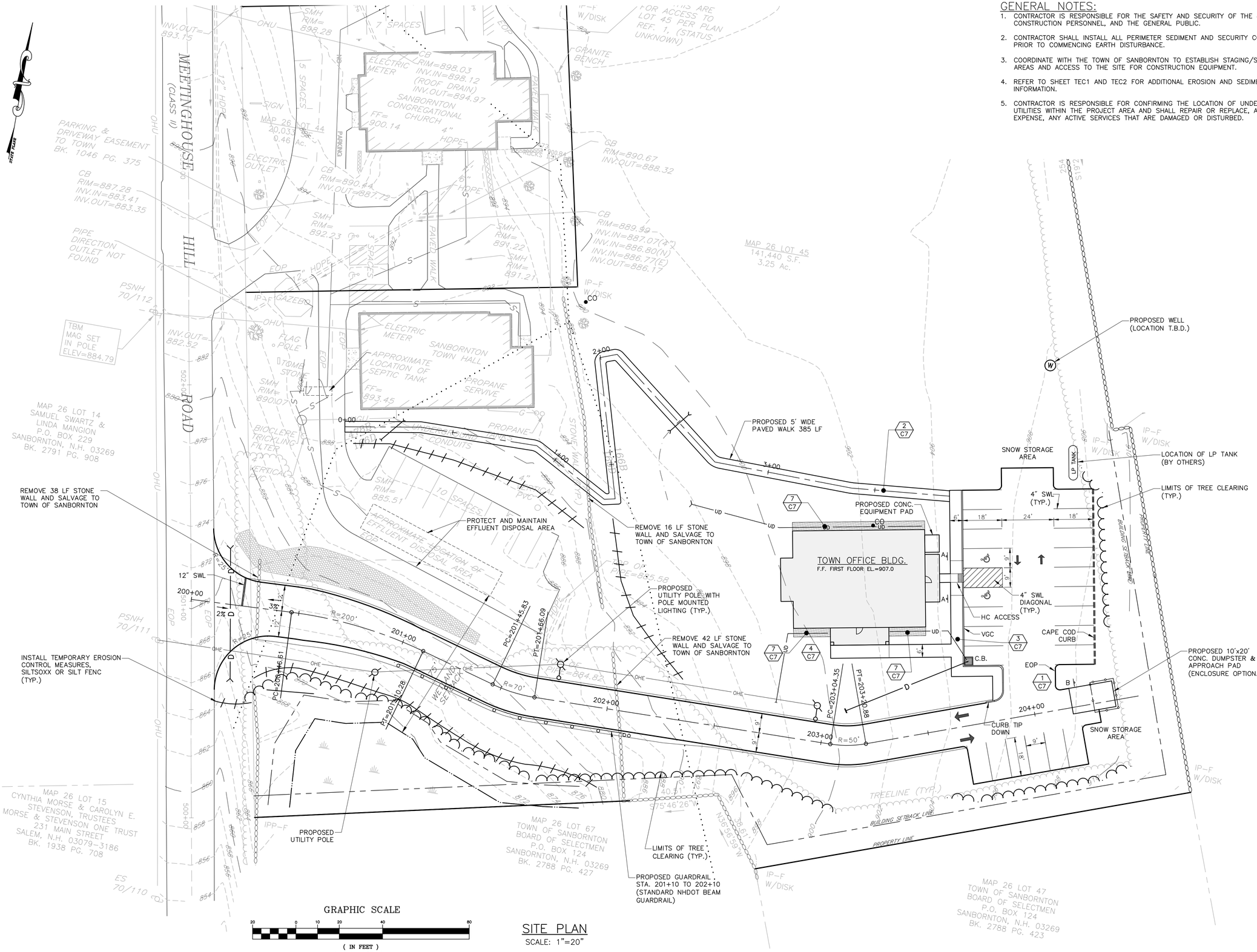
TYPICAL ACCESS ROAD CROSS SECTIONS

C1

P:\5175 Sanbornton Town Hall & PD\Drawings\01_Civil\DWG\5175 Access Rd Profile and Sections.dwg

GENERAL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR THE SAFETY AND SECURITY OF THE JOB SITE, CONSTRUCTION PERSONNEL, AND THE GENERAL PUBLIC.
2. CONTRACTOR SHALL INSTALL ALL PERIMETER SEDIMENT AND SECURITY CONTROLS PRIOR TO COMMENCING EARTH DISTURBANCE.
3. COORDINATE WITH THE TOWN OF SANBORNTON TO ESTABLISH STAGING/STOCKPILE AREAS AND ACCESS TO THE SITE FOR CONSTRUCTION EQUIPMENT.
4. REFER TO SHEET TEC1 AND TEC2 FOR ADDITIONAL EROSION AND SEDIMENT CONTROL INFORMATION.
5. CONTRACTOR IS RESPONSIBLE FOR CONFIRMING THE LOCATION OF UNDERGROUND UTILITIES WITHIN THE PROJECT AREA AND SHALL REPAIR OR REPLACE, AT HIS EXPENSE, ANY ACTIVE SERVICES THAT ARE DAMAGED OR DISTURBED.



SITE PLAN
SCALE: 1"=20'

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SHEET TITLE:
SITE LAYOUT PLAN

C2

DRAINAGE NOTES:

1. CONSTRUCT NEW CB
RIM = 905.71
12" HDPE INV. OUT (W) = 900.71

2. CONSTRUCT 12" HDPE PIPE X 61 LF
INV.OUT=900.0
WITH PRECAST MRM HEADWALL

3. CONSTRUCT15"Ø HDPE CULVERT X 60LF
WITH F.E.S.
INV.IN=900.0
INV.OUT=900.0

SEWER NOTES:

1. CONNECT 4" PVC PIPE TO EXISTING 4" SEWER WITH NEW 4" WYE CONNECTION

2. CONSTRUCT 4" PVC PIPE x 114 LF
S=0.02'/' MIN. (TBD IN FIELD)
CONSTRUCT 45° BEND WITH CLEANOUT
AS INDICATED

3. CONSTRUCT 4" PVC PIPE SERVICE CONNECTION TO BUILDING WITH CLEANOUT
NEW 4" PVC INV.OUT (TBD IN FIELD)

WATER SYSTEM NOTES:

1. CONSTRUCT 2" WATER MAIN TO PROPOSED MECHANICAL ROOM OF NEW BUILDING. INSTALL FITTINGS AS MAY BE REQUIRED.

MEETINGHOUSE HILL ROAD (CLASS II)

PROPOSED 12" HDPE PIPE X 10 LF CULVERT WITH END SECTIONS & LEVEL SPREADER OUTLET DITCH

PROPOSED 8" HDPE PIPE X 10 LF CULVERT WITH END SECTIONS

PROTECT AND MAINTAIN EFFLUENT DISPOSAL AREA

SLOPE STABILIZATION: GEOCELL SLOPE PROTECTION W/ LOAM, SEED & EROSION CONTROL MATTING (4" THICK)

PROPOSED 4" PVC FOUNDATION DRAIN TO DAYLIGHT (TYP.)

PROPOSED UNDERGROUND ELECTRIC & COMM. (TYP.)

PROPOSED UTILITY POLE WITH POLE MOUNTED LIGHTING (TYP.)

PROPOSED OVERHEAD ELECTRIC (TYP.)

PROPOSED UTILITY POLE

PROPOSED WELL (LOCATION T.B.D.)

LOCATION OF LP TANK (BY OTHERS)

TOWN OFFICE BLDG.
F.F. FIRST FLOOR EL.=907.0

SANBORNTON CONGREGATIONAL CHURCH
FF= 900.14

SANBORNTON TOWN HALL
FF= 893.45

APPROXIMATE LOCATION OF SEPTIC TANK

APPROXIMATE LOCATION OF EFFLUENT DISPOSAL AREA

MAP 26 LOT 14
SAMUEL SWARTZ & LINDA MANGION
P.O. BOX 229
SANBORNTON, N.H. 03269
BK. 2791 PG. 908

MAP 26 LOT 15
CYNTHIA MORSE & CAROLYN E. STEVENSON, TRUSTEES
MORSE & STEVENSON ONE TRUST
231 MAIN STREET
SALEM, N.H. 03079-3186
BK. 1938 PG. 708

MAP 26 LOT 45
141,440 S.F.
3.25 Ac.

MAP 26 LOT 67
TOWN OF SANBORNTON
BOARD OF SELECTMEN
P.O. BOX 124
SANBORNTON, N.H. 03269
BK. 2788 PG. 427

MAP 26 LOT 47
TOWN OF SANBORNTON
BOARD OF SELECTMEN
P.O. BOX 124
SANBORNTON, N.H. 03269
BK. 2788 PG. 423

PARKING & DRIVEWAY EASEMENT TO TOWN
BK. 1046 PG. 375

PIPE DIRECTION OUTLET NOT FOUND

TBM
MAG SET IN POLE
ELEV=884.79

PSNH 70/112

PSNH 70/111

ES 70/110

TREELINE (TYP.)

BUILDING SETBACK LINE

PROPERTY LINE

S75°46'26"W 40.71'

N36°36'59"W 33.61'

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

GRADING & UTILITY PLAN
SCALE: 1"=20'

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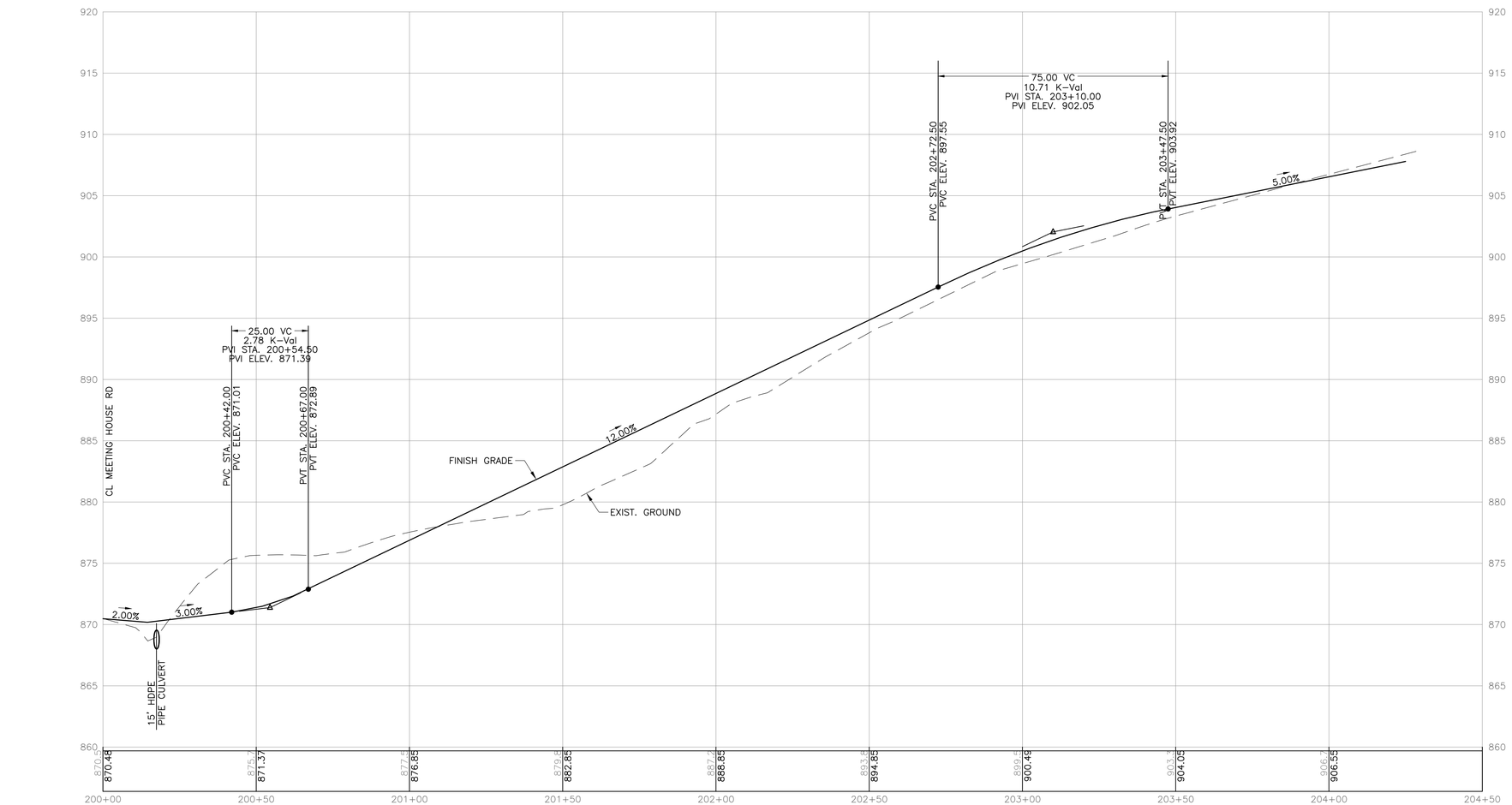
GRADING AND UTILITY PLAN

C3



V = 1 : 5

H = 1 : 20

ACCESS ROAD PROFILE

SCALE: 1"=10'H / 5'V

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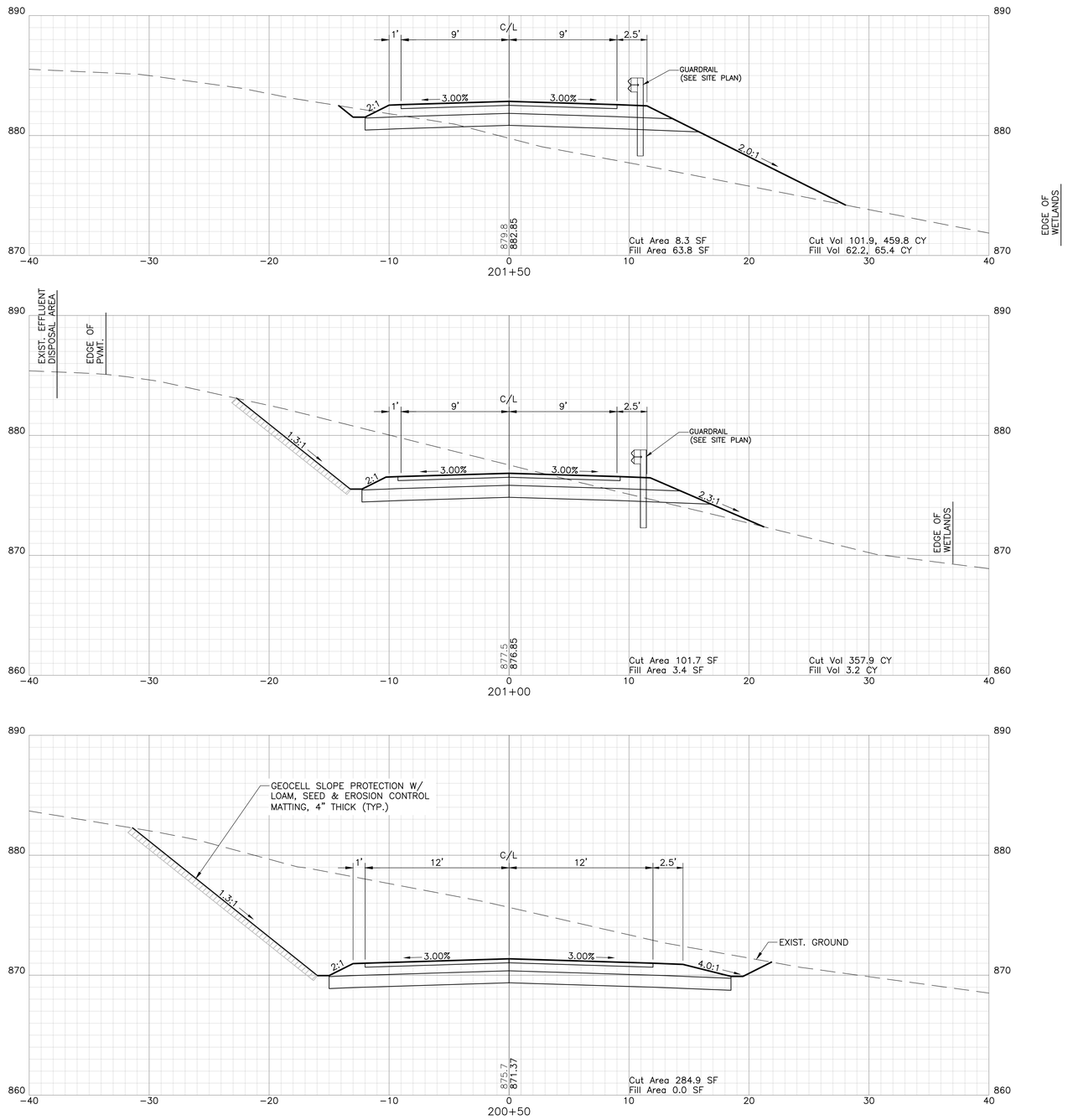
SHEET TITLE:

ACCESS ROAD PROFILE

C5



ACCESS ROAD SECTIONS

SCALE: 1"=10'

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ACCESS ROAD SECTIONS

C6.1

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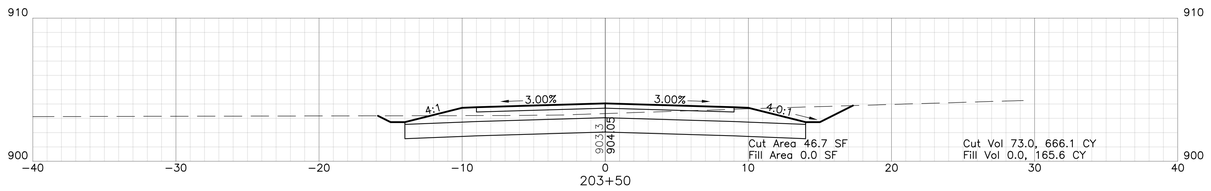

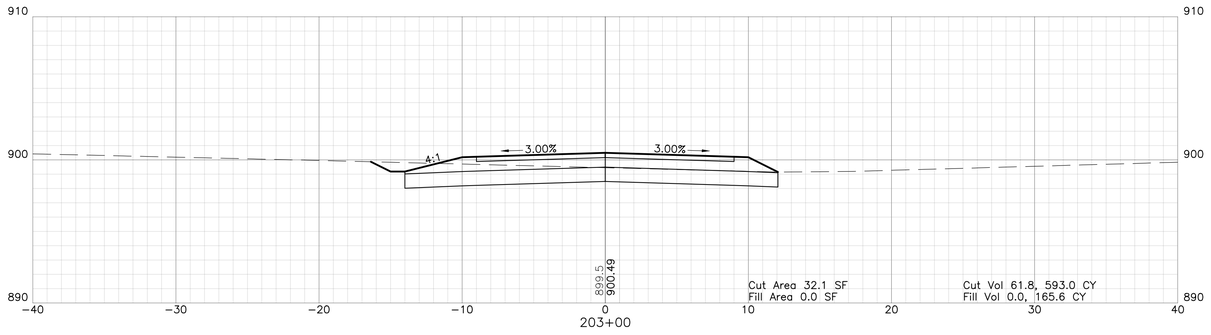

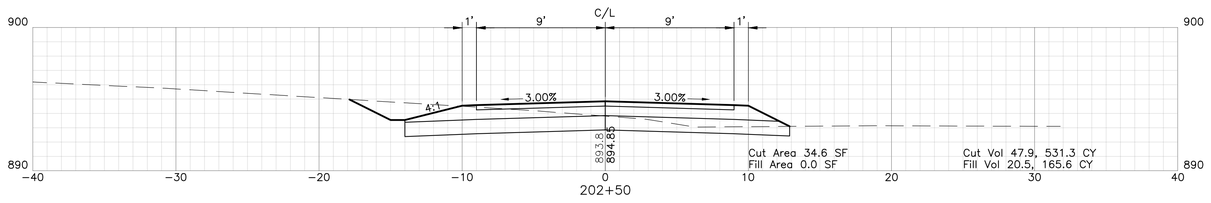

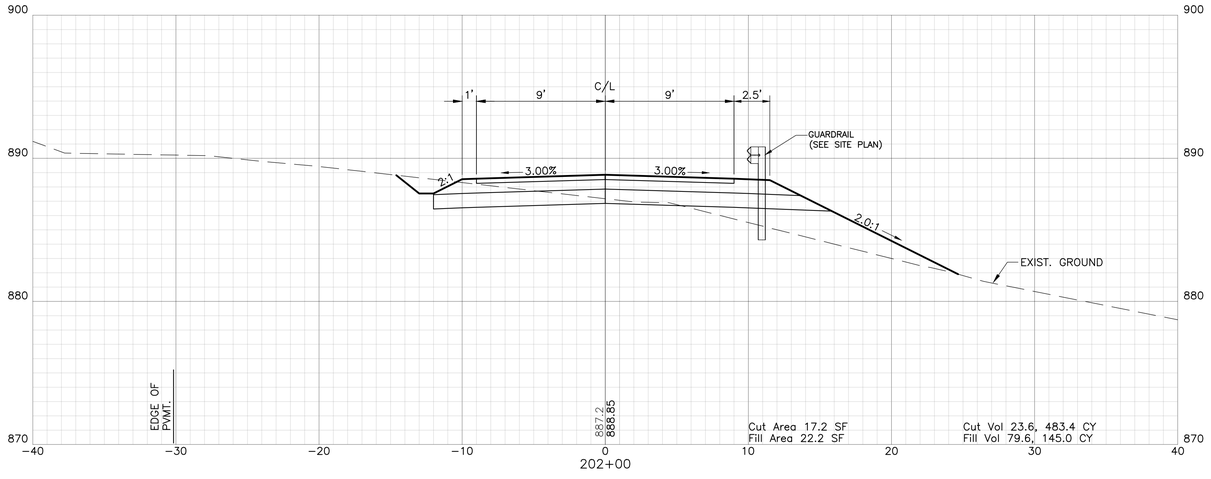

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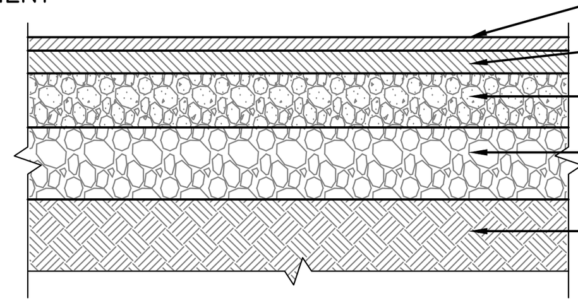
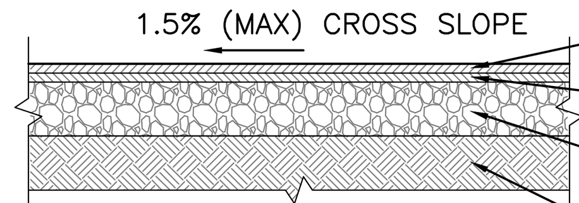
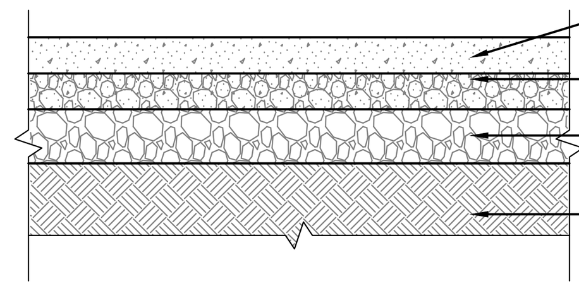
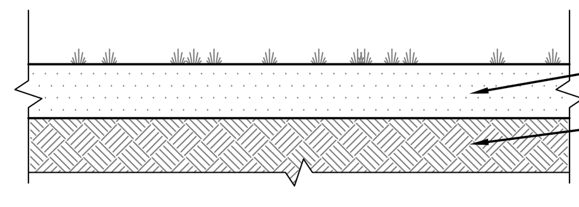
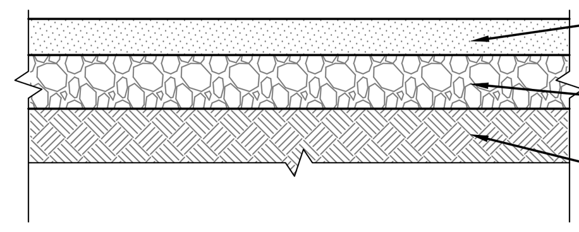
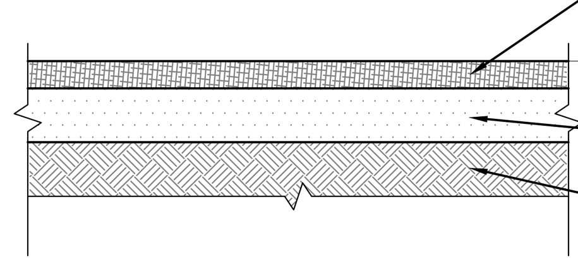
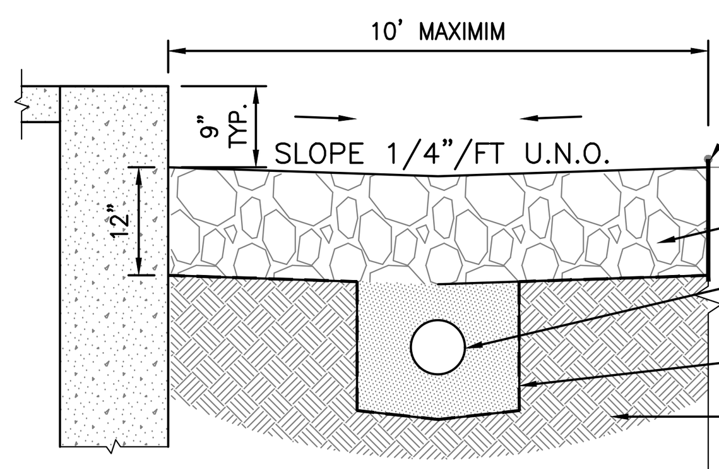
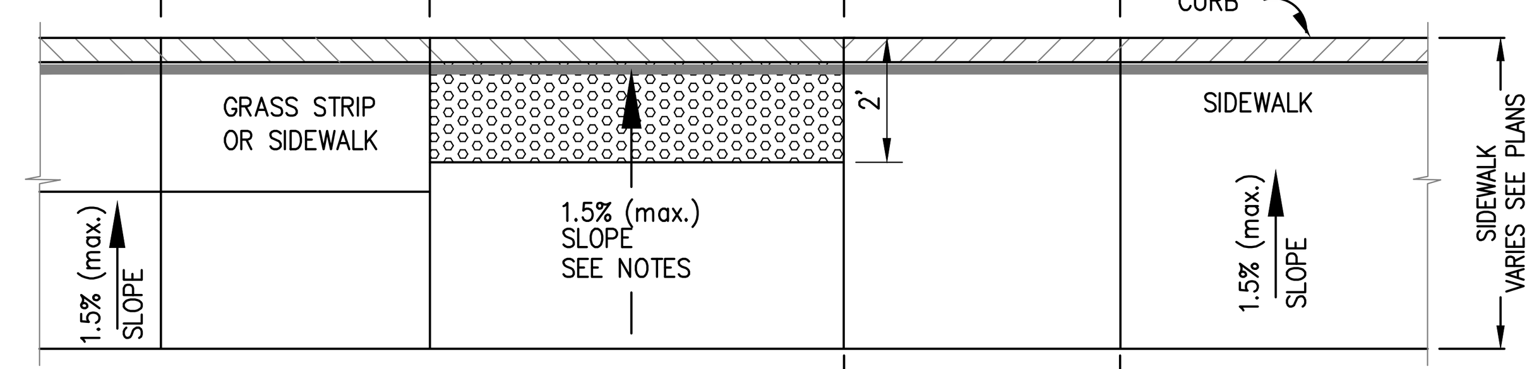
ACCESS ROAD SECTIONS

6.2

SECTION REFERENCE	DESCRIPTION	SECTION
1 / CX	NEW PAVEMENT	
2 / CX	BITUMINOUS WALKWAY	
3 / CX	CONCRETE WALKWAY	
4 / CX	LOAMING AND SEEDING	
5 / CX	GRAVEL DRIVE AREA	
6 / CX	BARK MULCH AREA	
7 / CX	DRIP ZONE	

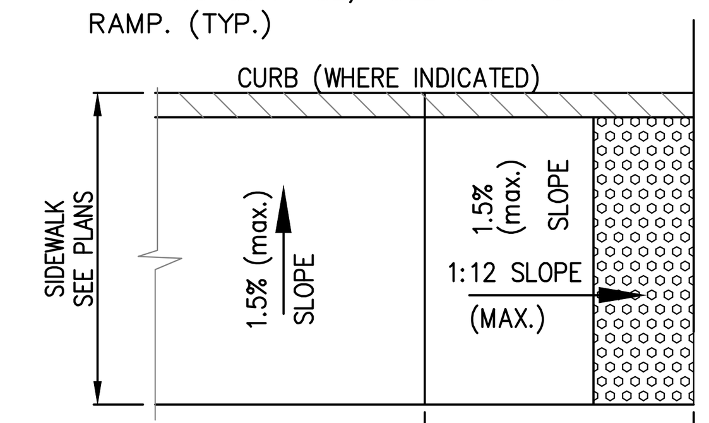
NOTE: THESE TYPICAL SECTIONS OF SURFACE TREATMENTS CAN BE FOUND ON SHEET C2

1 / – / C2 TYPICAL SECTIONS OF SURFACE TREATMENTS
SCALE: NONE



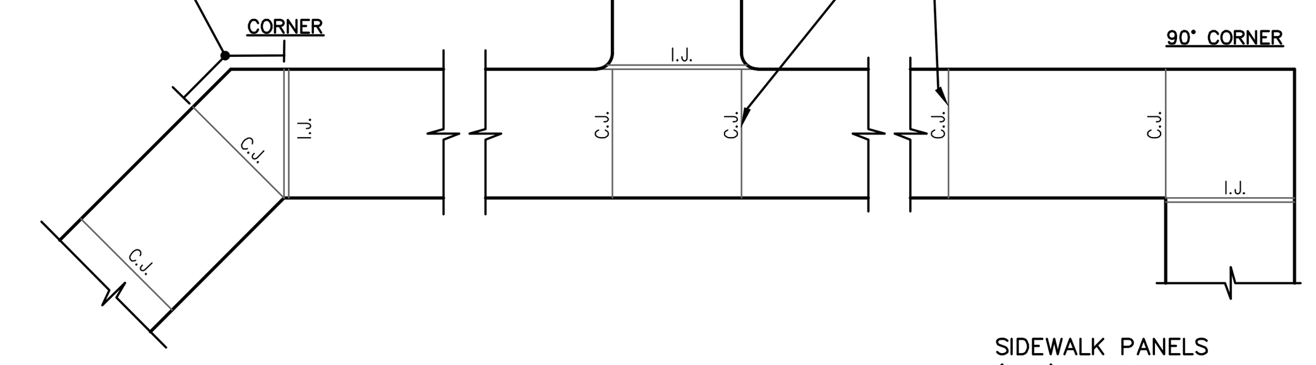
TYPE A

NOTES:
1. SLOPE OF RAMP VARIES WITH SIDEWALK WIDTH AND HEIGHT, WITH A MAXIMUM SLOPE OF 1 : 12.
2. A SKID RESISTANT FINISH TRANSVERSE TO THE SLOPE OF THE RAMP AND WARPED SIDEWALK SHALL BE USED ON PORTLAND CEMENT CONCRETE RAMPS
3. MAINTAIN THE NORMAL GUTTER PROFILE THROUGHOUT THE RAMP AREA.
4. INTERCEPT DRAINAGE ALONG THE CURB IN ADVANCE OF THE RAMP.
5. FORM 1" (±1/8" TOLERANCE) CURB LIP IN SIDEWALK PAVING MATERIAL.



TYPE B

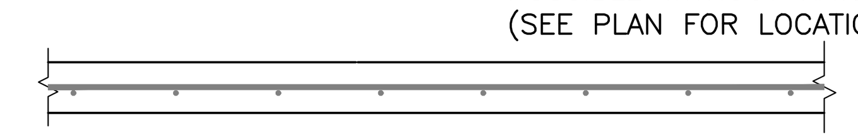
2 / – / C2 HANDICAP SIDEWALK RAMP
SCALE: NONE 3000



NOTES:
1. WALKS GREATER THAN 8'-0" IN WIDTH SHALL HAVE A CONTRACTION JOINT ALONG THE WALK CENTERLINE.
2. LENGTH-TO-WIDTH RATIO OF ALL SIDEWALK PANELS SHALL NOT EXCEED 1½ : 1 WITHOUT PRIOR APPROVAL OF ARCHITECT/ENGINEER.
3. INSTALL ISOLATION JOINTS (I.J.) @ 30' MAX. SPACING ALONG ANY STRAIGHT RUN OF SIDEWALK AND AT ANY CHANGE IN DIRECTION.
4. PROVIDE LIGHT BROOM FINISH U.N.O.

4 / – / C2 CONTRACTION JOINT (CJ) & ISOLATION JOINT (IJ) TYP.
SCALE: NONE

CONTROL JOINT (CJ) CUT TO A DEPTH OF 1/4 THE SLAB THICKNESS AS SOON AS POSSIBLE WITHOUT RAVELLING EDGES. (SEE PLAN FOR LOCATIONS)



SEE PLAN FOR SLAB THICKNESS AND REINFORCING REQUIREMENTS

NOTES:
1. FILL SAW CUT JOINTS WITH SEMI-RIGID EPOXY FILLER SIKADUR 51 SL BY SIKA CORP.
2. SEE PLAN FOR JOINT LOCATIONS.

6 / – / C2 CONTROL JOINT DETAIL
SCALE: NONE

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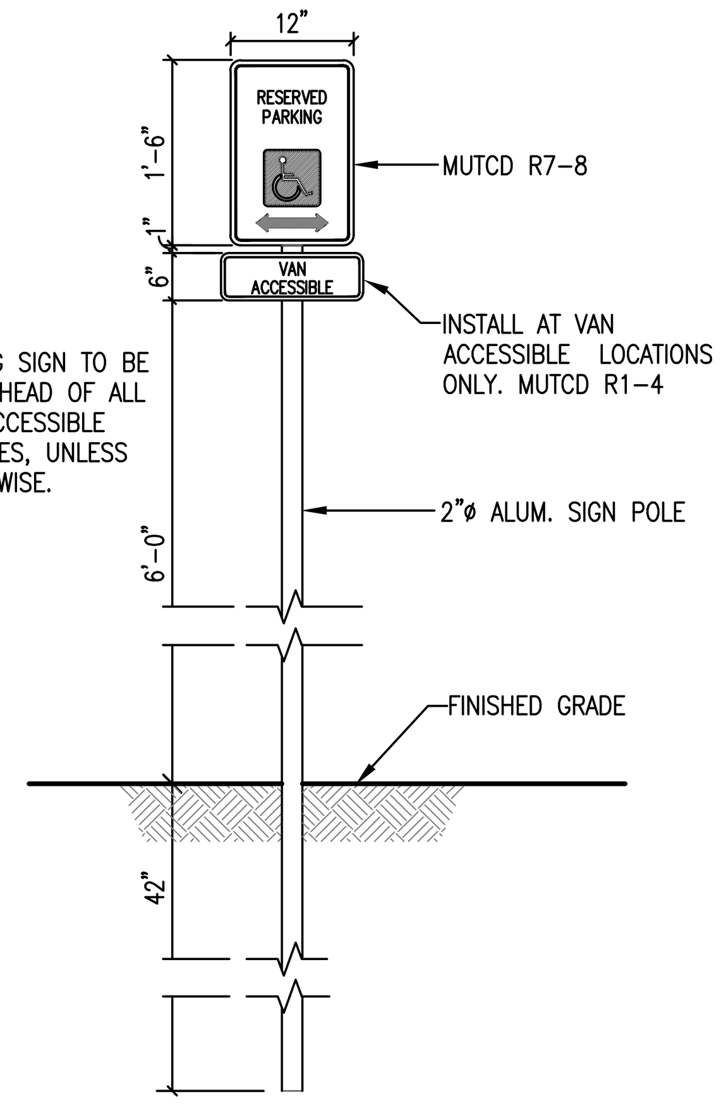
REVISIONS

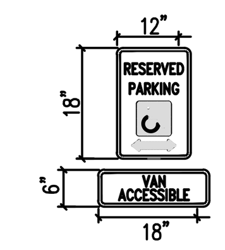
SHEET TITLE:
SITE DETAILS

C7

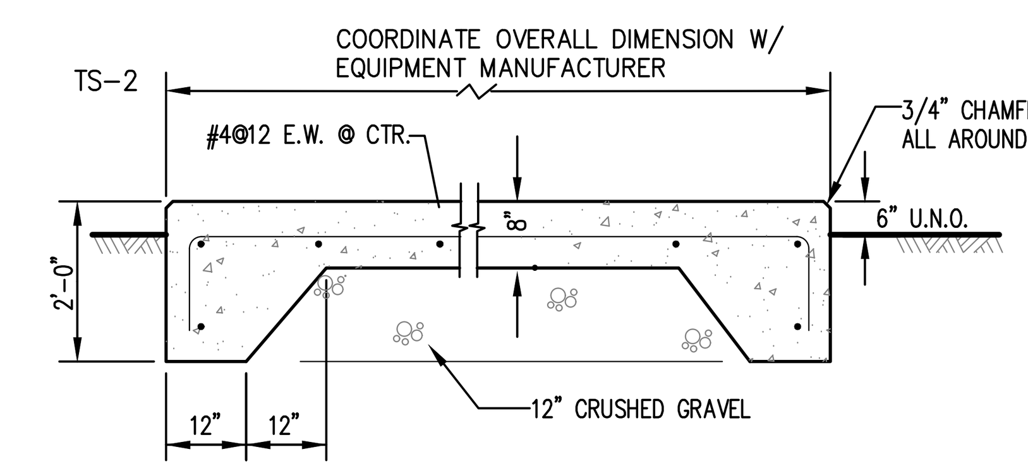


NOTE: PARKING SIGN TO BE INSTALLED AT HEAD OF ALL DESIGNATED ACCESSIBLE PARKING SPACES, UNLESS SHOWN OTHERWISE.

11 – C2 SIGN MOUNTING DETAIL
SCALE: NONE

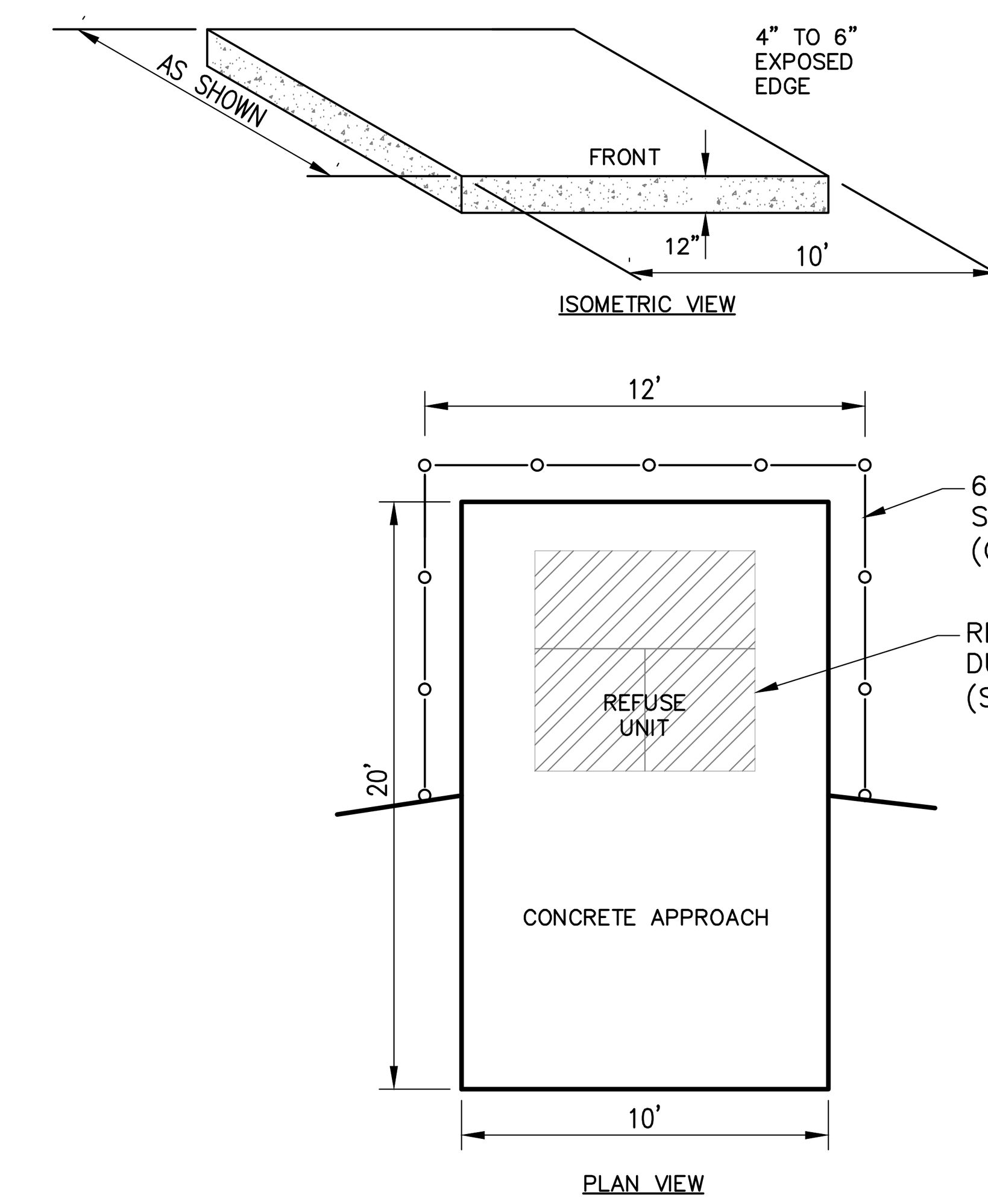
SYMBOL	MUTCD DESIGN		DESCRIPTION	SIZE	QUANTITY
A	R7-8		GREEN & BLUE / WHITE SINGLE POLE SINGLE MOUNTED	12"x18"	2
B	R7-1		NO PARKING ANY TIME	12"x18"	1

12 – – SIGN SCHEDULE
SCALE: NONE C3037A



NOTE: COORDINATE LOCATION w/ SITE PLAN

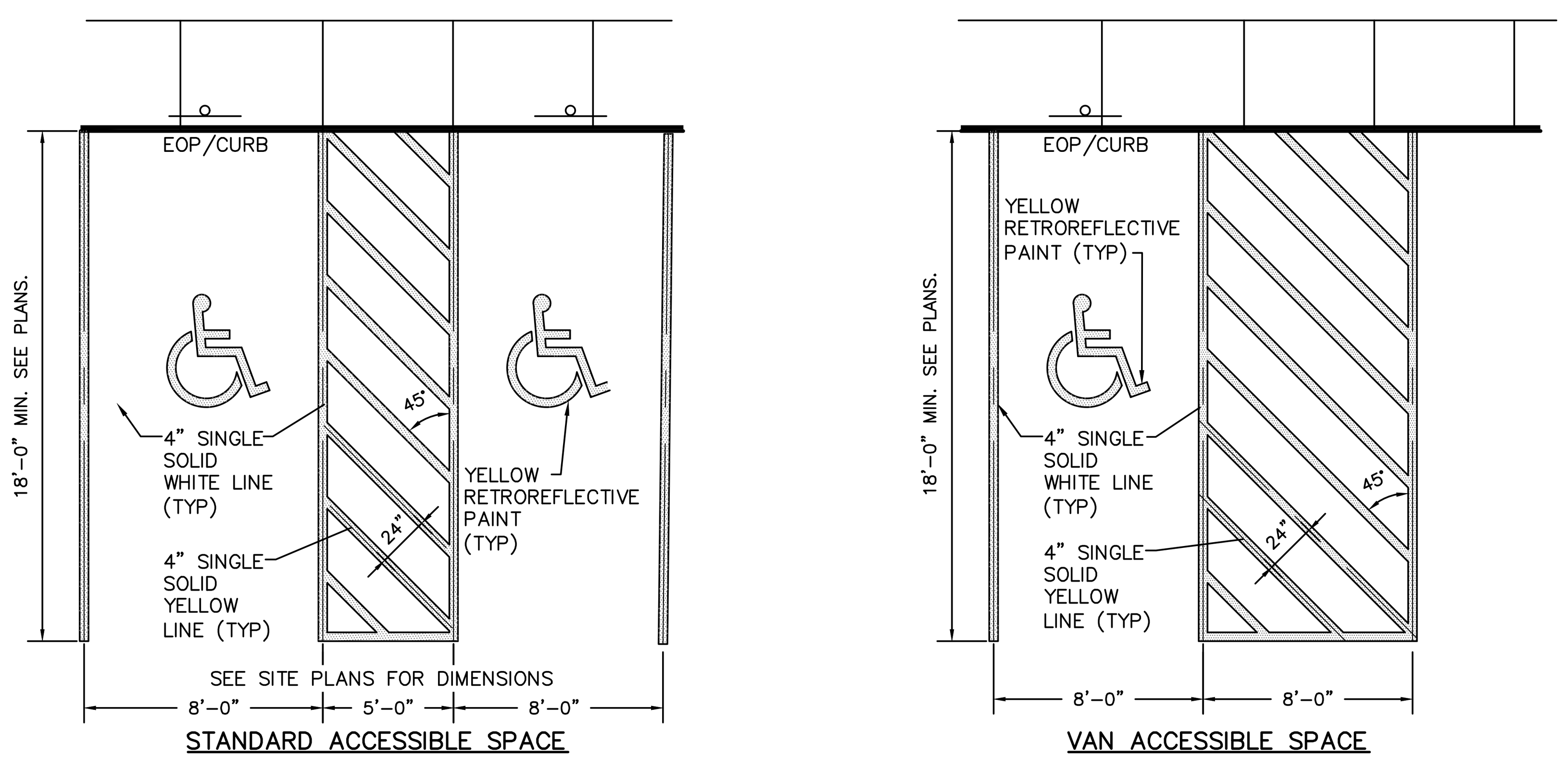
13 – C2 EXTERIOR EQUIPMENT PAD
SCALE: NONE C3017



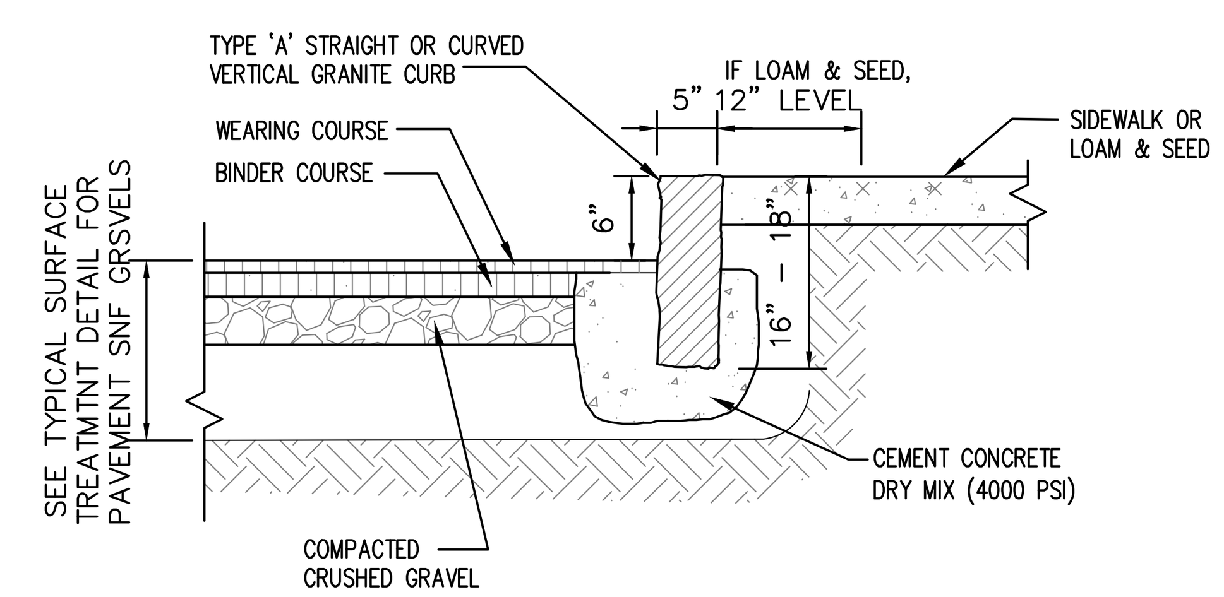
NOTES:

1. CONC. PAD TO BE 4000 PSI w/ #4 REINFORCING BARS AT 12" O.C., E.W. CENTERED IN SLAB.

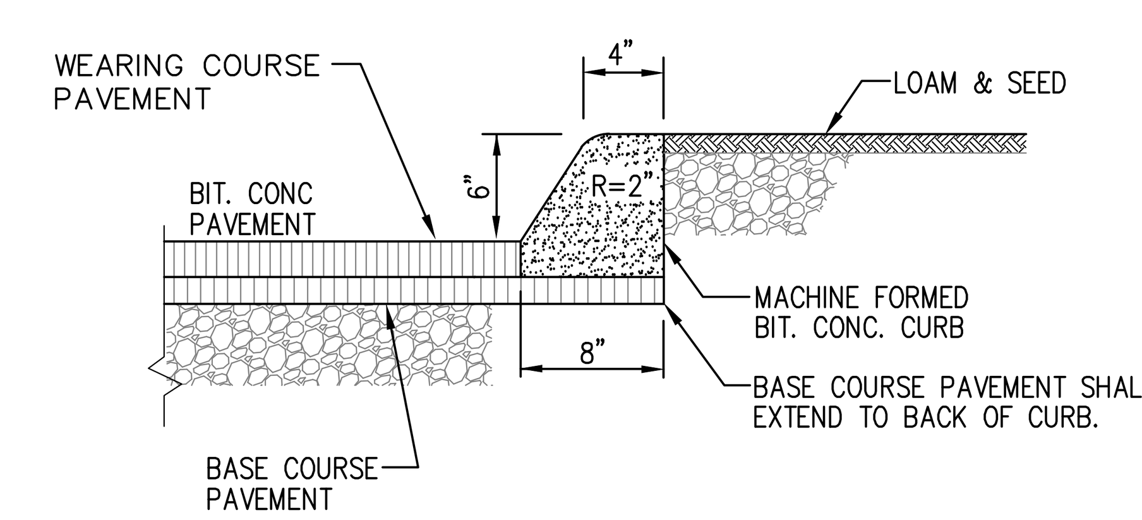
14 – C2 DUMPSTER PAD
SCALE: N.T.S. C3017E



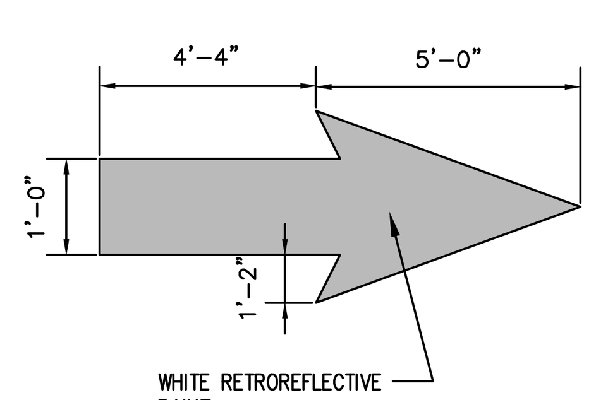
14 – C2 ACCESSIBLE PARKING SPACE LAYOUT
SCALE: NONE C3002



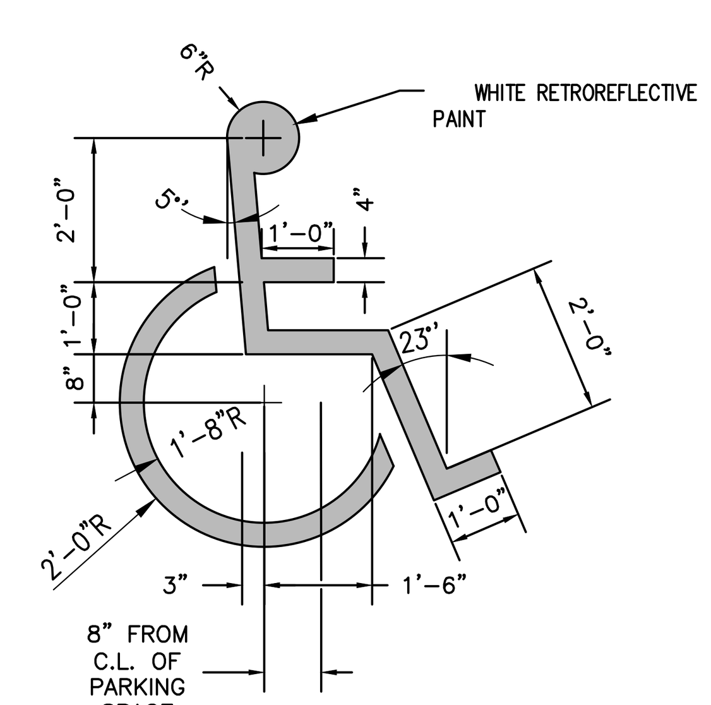
15 – C2 VERTICAL GRANITE CURBING
SCALE: 3/4" = 1'-0" C3023



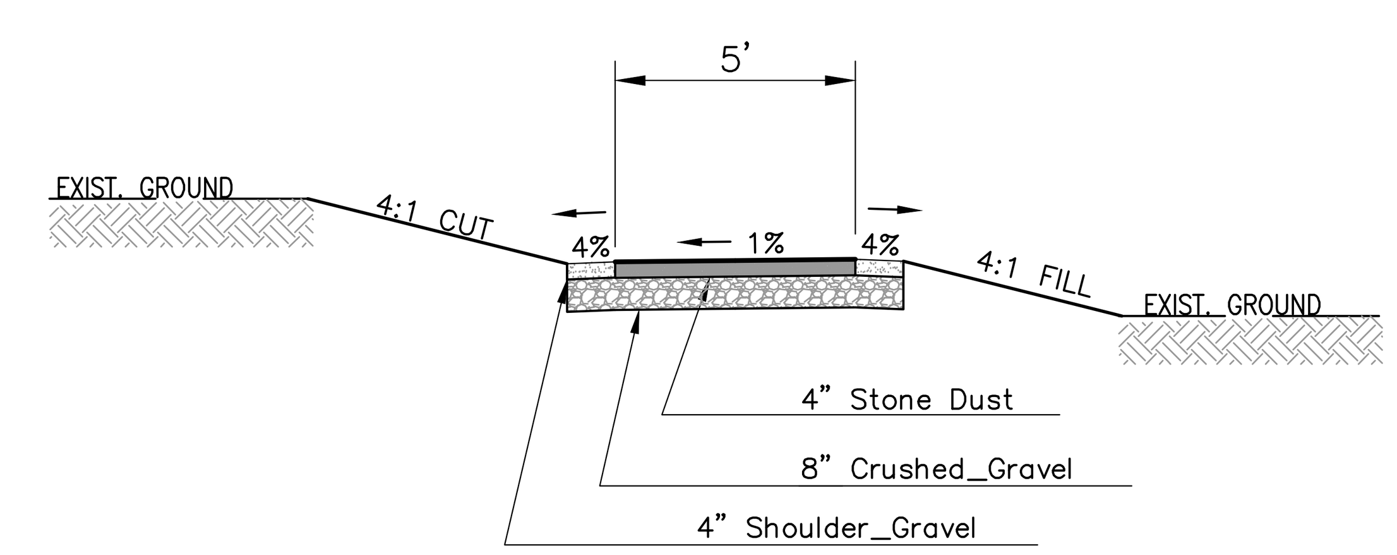
16 – – BITUMINOUS CONCRETE CURB
SCALE: NONE C3021A



17 – C2 TRAFFIC ARROW DETAIL
SCALE: NONE C3002



18 – C2 ACCESSIBLE SPACE MARKING DETAIL
SCALE: NONE C3002



19 – C2 TYPICAL PAVED WALK
SCALE: NONE

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PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

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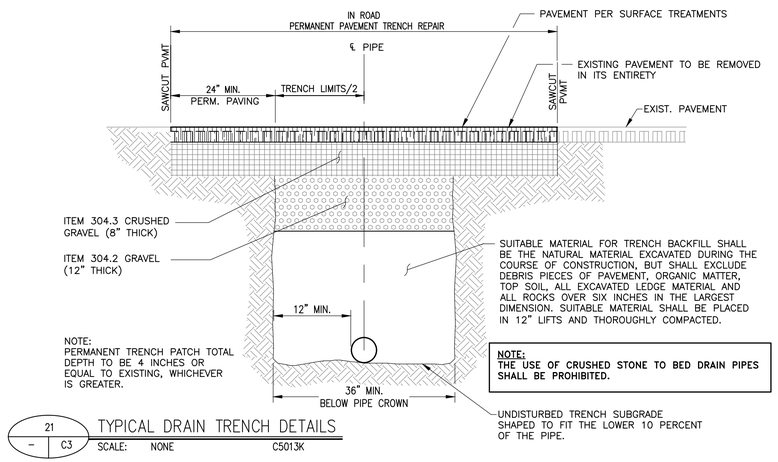
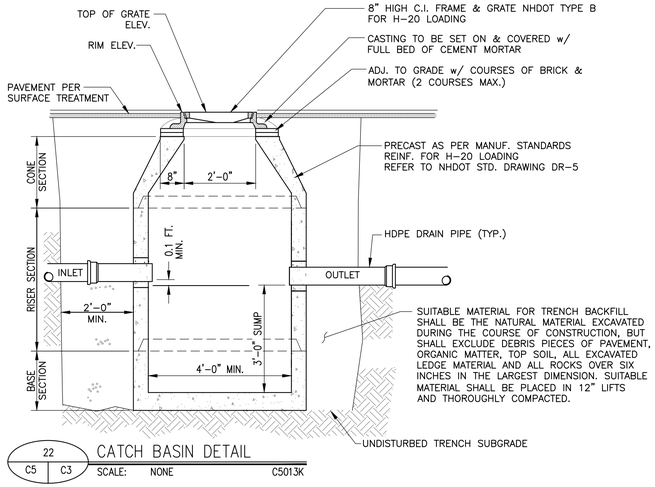
REVISIONS

SHEET TITLE:
SITE DETAILS

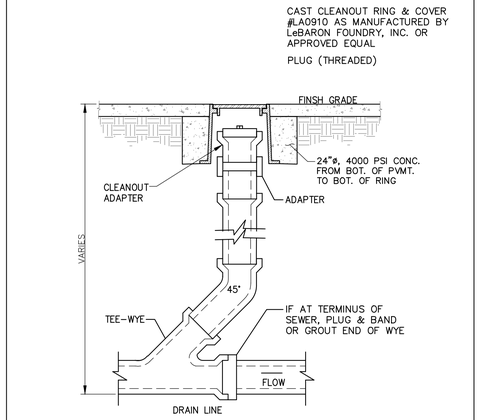
C8



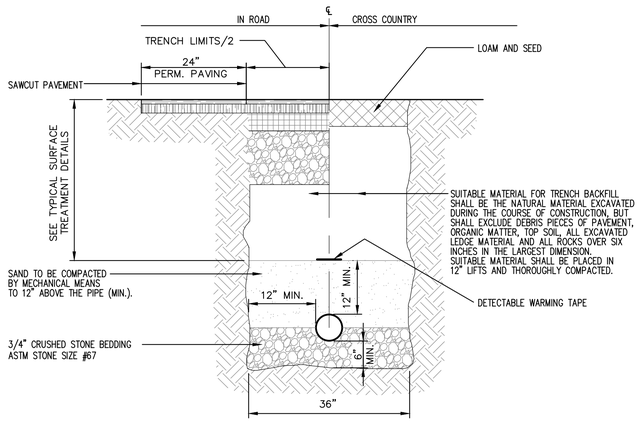
21 / – / C3 TYPICAL DRAIN TRENCH DETAILS
SCALE: NONE C5013K



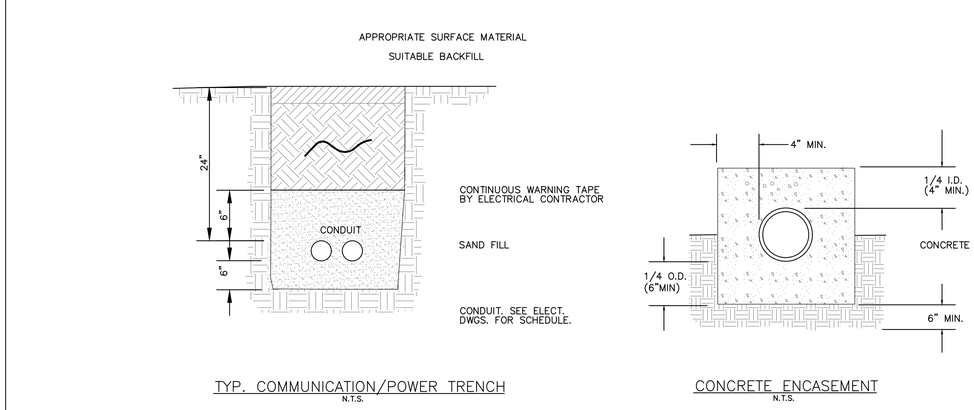
22 / C5 / C3 CATCH BASIN DETAIL
SCALE: NONE C5013K



23 / – / C3 TYPICAL CLEAN OUT DETAIL
SCALE: NONE C2013



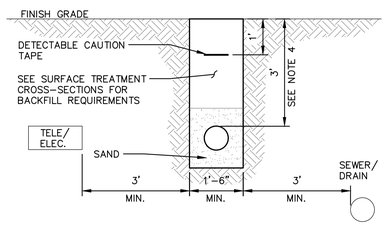
24 / C5 / C3 TYPICAL PIPE TRENCH DETAILS
SCALE: NONE



TYP. COMMUNICATION/POWER TRENCH
N.T.S.

CONCRETE ENCASEMENT
N.T.S.

25 / – / – ELECTRICAL / COMMUNICATION TRENCH DETAIL
SCALE: NONE C5013I



NOTES:

1. SAND BACKFILL SHALL CONSIST OF FINE GRANULAR MATERIAL, 100% PASSING A 1/4" SIEVE. NATURALLY OCCURRING SMOOTH ROUND PEBBLES NO GREATER THAN 3/8"ø ARE PERMITTED AS LONG AS THEIR TOTAL VOLUME PER CUBIC FOOT OF SAND DOES NOT EXCEED 1%. SAND SHALL SURROUND GAS LINE TO A MINIMUM DEPTH OF 6" BELOW AND 6" ABOVE THE PIPE.

2. SAND BACKFILL SHALL BE COMPLETELY FREE OF FROZEN LUMPS, ROCKS, STONES, DEBRIS, OR RUBBISH.

3. COORDINATE GAS LINE MATERIAL & SIZE W/ EQUIPMENT SUPPLIER.

4. GAS LINE SHALL HAVE MIN. 36" OF COVER; GAS SERVICE LINES SHALL HAVE MIN. 24" OF COVER.

5. TRENCH EXCAVATION & BACKFILL BY SITE CONTRACTOR.

26 / – / – GAS LINE TRENCH DETAIL
SCALE: NONE C5013N

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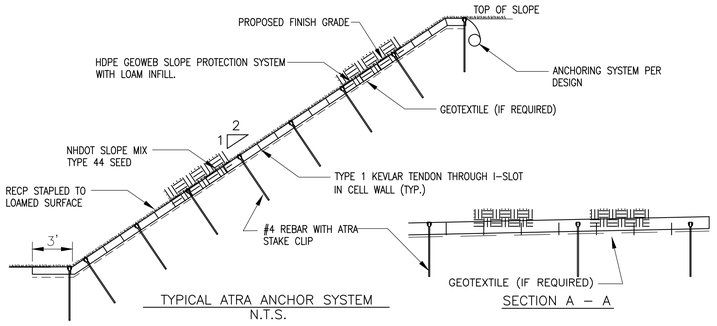
REVISIONS

SHEET TITLE:
UTILITY DETAILS

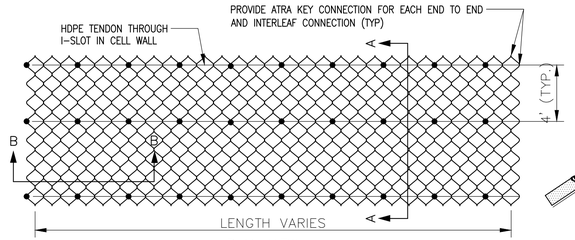
C9



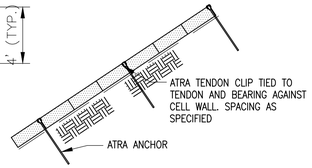
TYPICAL ATRA ANCHOR SYSTEM
N.T.S.

SECTION A – A

NOTES:
1. THE FOLLOWING WORK IS SUBSIDIARY TO ITEM 595 GEOCELL SLOPE PROTECTION.
2. GEOCELL SLOPE PROTECTION SHALL BE USED ON ALL ROADWAY EMBANKMENT SLOPES OF 2.5:1 OR GREATER.
3. THE TYPE AND QUANTITY OF TENDONS AND ATRA ANCHORS SHALL BE AS SPECIFIED
4. THE GEOCELL SHALL BE FILLED WITH LOAM
5. THE GEOCELL SECTIONS SHALL BE ANCHORED TO RESIST SLIDING DUE DRIVING AND HYDRAULIC FORCES.
6. PROVIDE A ROLLED EROSION CONTROL BLANKET (RECP) (TEMPORARY SLOPE MATTING TYPE D) TO PREPARED LOAM AND SEEDED SURFACES.
7. THE GEOCELL PANELS SHALL BE CONNECTED WITH ATRA KEYS AT EACH INTERLEAF AND END TO END CONNECTION.



PLAN VIEW

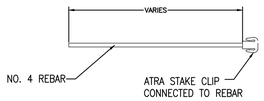


SECTION B – B

STAKE ANCHOR INSTALLATION

STEPS:
1. POSITION THE ATRA ANCHOR NEXT TO THE UP-SLOPE CELL WALL.
2. DRIVE ATRA ANCHOR INTO THE GROUND UNTIL ARM OF ATRA STAKE CLIP IS LOCATED ABOVE GEOWEB CELL WALL.
3. ENGAGE ARM OF ATRA STAKE CLIP TO CELL WALL AND DRIVE UNTIL TIGHT.

ATRA ANCHOR DETAIL



31 / C3
SLOPE STABILIZATION DETAIL
SCALE: NONE

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SHEET TITLE:
SITE DETAILS

C10

SITE DESCRIPTION

Project Name TOWN OFFICE BUILDING
TOWN OF SANBORNTON
SANBORNTON NEW HAMPSHIRE

PROJECT DESCRIPTION: This project includes demolition of an existing structure, erecting a new wood framed building on a new foundation and constructing a new asphalt sidewalk connection the new building and the parking lot. Work will include demolition, topsoil stripping, cuts and fills, excavation for utilities, bituminous paving, concrete placement, and preparation for final seeding and landscaping.

Construction is expected to commence in FALL of 2020 and will ensue for 12 months.

SOIL DISTURBING ACTIVITIES WILL INCLUDE: Topsoil stripping, shallow excavations, rough grading, gravels placement.

CONSTRUCTION ACTIVITIES WILL INCLUDE: Topsoil stripping, installation of perimeter and other sediment controls, transport and stockpiling of excavation materials, importation and placement of granular materials, excavation , bituminous paving, building erection and preparation for final seeding and landscaping.

RUNOFF COEFFICIENT: The final coefficient of runoff for the site following this project will be c=0.3.

SITE AREA: The entire site encompasses 2.78 acres; construction activity will disturb 0.8 acres.

SOILS TYPES: According to the USDA NRCS Web Soil Survey 3.1 of Merrimack and Belknap Counties, New Hampshire, onsite soils in this prospect area are classified as:

116B CANTERBURY FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES
116D CANTERBURY FINE SANDY LOAM, 15 TO 25 PERCENT SLOPES
478B GILMANTON FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES

CRITICAL AREAS: These areas are subject to potential erosion problems:
1. Topsoil stripping
2. Earth cuts and fills
3. Site grading
4. Drain line excavation
5. Demolition

Name of Receiving Waters: na

GENERAL NOTES

1. The Contractor shall not cause or contribute to, or allow the activity to cause or contribute to, any violations of the surface water quality standards established in Env-Wq 1700.

2. All best management practices contained herein are to be reviewed and monitored by the construction superintendent, and shall be in accordance with the NHDES Stormwater Manual, Volumes 1-3. The project administrator retains the right to modify, terminate, or require additional practices as required by the site conditions.

3. Erosion control measures are to be correctly installed before any demolition, clearing, excavation, construction, dewatering, or water diversion activities are undertaken. All drainage outlets, swales, and ponds shall be stable before introducing runoff into the structures and appurtenances.

4. These erosion and sediment control plans and details (TEC sheets) are only applicable for permitting, the establishment and maintenance of erosion control, sediment control, stormwater management, and dewatering, associated with construction activities for the project, and are not intended for site and building purposes. These drawings are to be utilized prior to and during construction of the project.

5. Contractor shall coordinate location of staging/stockpile area(s), temporary sedimentation measures, stabilized construction exit(s), and vehicle washout area(s) in the field with The Town of SANBORNTON. In all instances they shall be located so as not to constitute a violation of any condition outlined herein.

INSPECTION/MAINTENANCE PROCEDURES

These are the inspection and maintenance practices that will be implemented to maintain erosion and sediment controls. Inspections shall be conducted by the construction superintendent and/or his designee, or as indicated on the DES permit (if applicable). These individuals shall be responsible for inspections, maintenance, and repair activities, and filling out the inspection and maintenance report. Repairs and maintenance to erosion control devices shall be executed by the Contractor.

All control measures will be inspected at least once per week and during any storm event in which 0.25 inches of precipitation or more falls within a 24 hour period, and daily during sustained periods of rainfall. If the environmental monitor is unable to be present during such a storm, the monitor shall inspect the site within 24 hours of the rain event. Inspections shall be documented and maintained onsite for the duration of the project.

All measures will be maintained in good working order; repairs as required will be initiated within 24 hours of report. Revisions to the erosion control plan, if required, must be completed within seven calendar days following the inspection.

Sediments will be removed from siltation fencing when one-third of fence height is obscured, and/or when bulges develop in the silt fence. Silt fencing will be inspected regularly for sediment depths, tears, and securement to support posts and proper anchorage. If alternative filtration measures are utilized (filter logs stump-grinding berms) they shall be inspected regularly for deficiencies and excessive depths of silt. When silt accumulates to one-third the height of the measure it shall be removed.

Check dams, stone and/or otherwise, shall be inspected after each runoff event greater than 0.25-inches and on a weekly basis. Correct all damage immediately. If significant erosion occurs between structures, install a liner of stone or other approved material in that portion of channel. Remove sediment accumulated behind the check dam as needed or directed to allow channel to drain through the check dam and prevent large flows from carrying sediment over the dam. Replace material as needed or directed to maintain the design cross-section of the check dams. Upon completion of construction activity, remove check dams and stabilize existing ground.

Filter log barriers (geosocks), if used, will be inspected after each rainfall and daily during extended storm periods. Replace logs where damaged or repair is necessary. Damaged filter logs, undermining, and end run erosion will be repaired promptly. Sediment deposits will be removed when depths are approximately one-third the log height.

Sedimentation basins will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 10% of the design capacity or at the end of the job. The Contractor shall install a visual indicator for assessing accumulated depth of sediment when constructing basin.

Public rights-of-way adjoining the project area will be inspected daily and maintained in a condition to prevent accumulation of tracked or flowing sediments. Any sediment spilled, dropped, washed, or tracked onto public rights-of-way shall be immediately removed.

Temporary and permanent seeding will be inspected for bare spots, washouts and poor growth. Such areas will be reestablished within 14 days.

Temporary sediment devices will be inspected daily during any construction dewatering processes. Remove or reconstruct devices when sediment is at 50% of the total volume.

Erosion control matting shall be installed on prepared soil subgrades, according to the details on the TEC sheets and the manufacturer's specifications. The matting shall be inspected regularly for signs of failure until permanent stabilization is established.

CONSTRUCTION SEQUENCE NOTES

CONTRACTOR IS RESPONSIBLE FOR DEVELOPMENT OF DETAILED CONSTRUCTION SEQUENCE.

1. Install silt fencing and other filtration barriers, inlet protection, and erosion and sediment control measures prior to start of any earth moving operation; measures are to be maintained until final stabilization is achieved, as defined on this sheet. Extra silt fence, hay bales, mulch, matting, stone, and other erosion and sediment control materials shall be maintained on site to replace damaged and destroyed controls until final stabilization occurs site-wide.

2. Clearly delineate limits of disturbance. Strip and stockpile all loam and/or excess material to be saved. Stabilize stockpiles as required and throughout the course of the sitework. Refer to 'Controls' section on this sheet.

3. Prior to commencing fill placement and rough grading, construct and stabilize temporary sedimentation ponds, swales, compost berms, wattles and other stormwater conveyances to route runoff away from the construction area as defined on these plans. Ensure the soil in these disturbed areas is stabilized prior to directing runoff or stormwater discharges into and through the measures.

4. Demolish the building as shown on the plans. Preserve the concrete foundation

5. Prepare the gravels beneath the new building slab and extend utility lines to the existing services. The Contractor shall be responsible for ensuring the grading allows surface run-off from unstabilized areas to flow toward stabilized areas and toward the protective measures for sediment retention.

6. Install underground utilities, place foundations and slabs..

7. Construct new building.

8. Rough grade around the building and establish this path of the new sidewalk. Install/Extend drainage culverts as shown.

9. Place select gravels for the new sidewalk and place asphalt surface.

10. Perform final/fine grading including loaming and seeding. Install mulch, rolled erosion control matting, and any other stabilization methods where required and/or indicated. Install all site landscaping. Contractor shall be responsible for temporary irrigation of stabilized and seeded areas until vegetation is established with a minimum of 85% coverage.

11. After all areas have been stabilized, remove all accumulated sediments, perform finish grading, and any necessary reseeding at all disturbed areas within the permanent infiltration basins and vegetated swales. Remove temporary sedimentation basins and swales. Complete finish grading and stabilization of disturbed areas.

12. Finish any remaining site construction.

13. Remove silt fence, temporary stone, and other temporary erosion control measures after vegetation is established. Silt fencing is to be cut-off at ground level, so as not to destabilize the terrain during removal. If the ground does become destabilized, relearn and seed. Perform final site clean-up.

14. Clean all drainage structures, pipes, sumps, swales, and basins of all silt and debris. Jet clean sewer service lines.

15. Construction sequencing will be dependent upon a number of factors, including time of year, site access, and the Owner's schedule. The Contractor shall develop a detailed construction sequencing plan to include accommodations for winter project conditions, and submit it to the Engineer and Owner for review prior to commencement of construction.

EROSION & SEDIMENT CONTROL

1. Erosion control measures shall be installed per plans and details. Perimeter controls shall be in place prior to commencement of earth-moving or demolition operations. Contractor shall maintain additional erosion and sediment control measures (silt fence, stone, matting, seed....) for the duration of the project.

2. The smallest practical area shall be disturbed during construction, but in no case shall exceed 5 acres at any one time before the disturbed areas are stabilized.

3. All areas of unstabilized soil shall be stabilized as soon as practical but no later than 45 days after initial disturbance, and shall be permanently stabilized no later than 3 days after final grading.

4. An area shall be considered stable if one or more of the following has occurred:
   a) Base course gravels have been installed in areas to be paved
   b) A minimum of 85% vegetated growth has been established
   c) A minimum of 3" of non-erosive material such as stone or riprap has been installed
   d) Erosion control blankets have been properly installed

5. Areas remaining temporarily unstabilized for a period of more than 14 days shall be temporarily seeded and mulched. All areas shall be stabilized within 45 days of initial disturbance. Cut and fill slopes shall be loamed/seeded/mulched within 72 hours of achieving final grade, and proposed pavement areas shall be stabilized within 72 hours of achieving final grade.

6. In areas to be seeded, remove all stones and trash from the area. On slopes 4:1 or steeper, final preparation shall include creating horizontal grooves perpendicular to the direction of the slope with a bulldozer or similar tracked piece of equipment to catch seed and reduce runoff (tracking). Fertilizer application shall comply with Dept. of Environmental Services regulations. Divert all runoff from the seeded area. All seeding shall occur prior to September 15. Areas seeded between May 15 and August 15 shall be covered with hay or straw mulch applied at a rate of 1.5 to 2 tons (90 to 100 bales) per acre. Min. 85% vegetated growth cover shall be achieved prior to October 15. All slopes of 3:1 or as noted on these plans shall be matted.

7. Install and stabilize permanent and temporary detention basins and swales prior to beginning rough site grading. All ditches and swales shall be stabilized prior to directing runoff into them.

8. Disturbed areas not in pavement or otherwise shown to be treated shall receive 6 inches of loam and seed as indicated on the plans.

9. The Contractor shall be responsible for implementing erosion control measures in order to prevent off-site tracking of earth, sediment and debris.

10. Dust shall be controlled as necessary through the use of water.

11. Soils to be stockpiled for a period of more than 14 days shall be stabilized with temporary seed and mulch, and surrounded with a filtration barrier at the toe of slope.

12. Temporary seeding shall use Perennial Ryegrass, applied at a rate of 30 Lbs/Acre (0.7 Lbs/100 SF). Refer to the NHDES Stormwater Manual, Vol. 3, Table 4-1 (pg. 58).

13. Permenent seeding shall comply with NHDES Type C mixture as specified in the NHDES Stormwater Manual, Vol 3, Table 4-3 (P.66). The mixture shall be applied at a rate of 60 Lbs/Acre and shall consist of the following:

Tall Fescue -	20 Lbs/Acre
Creeping Red Fescue -	20 Lbs/Acre
Red Clover -	20 Lbs/Acre

14. Repair, clean, and replace any sediment controls damaged during and/or after rainfall events.

15. Areas which have been temporarily or permanently seeded shall be mulched immediately following seeding.

16. Following permanent stabilization, temporary erosion control measures shall be removed and accumulated sediments will be disposed of in an approved location, outside of jurisdictional wetlands.

17. All erosion and sediment control measures shall be inspected no less frequently than once every seven days and after each storm event of 0.25-inches or greater in a 24 hour period.

18. This project shall be managed in a manner that meets the intent and requirements of RSA 430:53 and Chapter Agr-3800 relative to Invasive Species. Site contractor is responsible for removal and disposal of invasive species, if any, in accordance with State regulations.

CONSTRUCTION MATERIALS INVENTORY

The following materials are expected to be present onsite during construction:
Petroleum based products, fertilizers, granular fill, solvents, metals & reinforcing steel, masonry products, concrete, paints, lumber, and plastics.

CONTROLS

Erosion and Sediment Controls:
Siltation Fencing - Will be installed continuously at slope limits where runoff will occur as sheet flow, and not in channels or drainage ways. Maximum slope above the fence shall be 2:1 and max. length of slope above fence will be 100'. Maximum areas draining to fence shall be 1/4 acre per 100' of fence. Fencing shall follow the contours of the land and flare upslope at the ends. Embed fabric in an excavated trench (min. 4"x4"). If terrain does not permit trench installation, embed base of fabric in min. 8" of 3/4-inch stone. Overlap adjoining sections of fence min. 6". All manufacturer's installation recommendations shall be followed.

Erosion Control Mix - Erosion control mix may be placed to provide for temporary control of erosion or sedimentation including; slope stabilization, check dams and berms, inlet control, or where ordered. The mix shall not consist of wood and bark chips, ground construction debris, or repurposed wood products. The mix shall have an organic portion between 25% and 65%, dry weight basis, and be fibrous and elongated such as from shredded bark, stump grindings, composted bark, or equivalent manufactured products. The mix shall not contain silts, clays, or fine sands. The pH of the mix shall be between 5.0 and 8.0 and a particle size by weight of 100% passing a 3-inch screen, 90%-100% passing a 1-inch screen, 70%-100% passing a 0.75-inch screen, and 30%-75% passing a 0.25-inch screen.

When used as a berm they shall be used in areas where runoff will occur as sheet flow and not in channels or drainage ways. Maximum slope above the berm shall be 5%. Berms shall follow the contours of the land and be at least 12-inches high and 2-feet wide.

Stone Check Dams - Shall be constructed to the lines, grades, and locations shown on the plans and details or as directed. Remove stone as directed when no longer needed. Stabilize with vegetation any sediment which is permitted to remain in place. Add stone as necessary throughout the project to maintain correct dam height. Check dams shall remain in place until permanent site stabilization is achieved as defined on this sheet.

Temporary Inlet Protection - Inspect devices weekly and after every rainfall event of 0.25" or greater. Replace, clean, or remove measures as directed. If the inlet becomes obstructed, clear debris away immediately. Inlet protection shall remain in place until final site stabilization is achieved.

Erosion Control Matting - Shall be installed to stabilize all disturbed earthen slopes of 3:1 or steeper and in all vegetated swales. Matting shall be installed per the manufacturer's recommendations within 24 hours after seed has been sown. Remove stones and trash from the slope prior to installing matting and before any rain event. Anchor mats at the top of the slope in a trench per instructions. Unroll matting in the direction of water flow, overlapping the edges and stapling as required. Lay blankets loosely, maintaining soil contact and not stretching the material.

Stabilized Construction Exit - Will be constructed as shown on the plans or as directed in the field per the construction details. All traffic exiting the construction area shall pass over the stabilized exit. Minimum stone size shall be 3-inches, placed to a min. depth of 6-inches. Place geotextile filter fabric between the stone and the earth beneath. Topdress or replace stone when soil particles clog the voids such that sediments are tracked off-site. Stabilized construction exit shall be maintained in working order until the site is permanently stabilized. Exit shall be constructed with a superelevated slope to direct runoff away from the public Right-of-Way.

Work Area Dewatering Systems - Will be constructed within the limits of the work area. Dewatering systems shall be one or multiple applications of the details included herein. No construction runoff shall be discharged directly into wetlands, drainage channels, onto abutting properties, or into closed drainage systems. Dewatering operations shall immediately cease if the receiving area shows signs of instability or erosion. All channels, swales, and ditches excavated for dewatering discharge shall be stable prior to receiving discharges. No dewatering shall occur during periods of intense, heavy rain. Where possible, dewatering discharge shall drain to a vegetated buffer by sheet flow.

Temporary Sedimentation Devices - Will be constructed/installed to provide for the interception of sediment-laden discharge from dewatering operations, and shall be stabilized prior to receiving discharge. Devices shall be appropriately sized per NHDES regulations for volume of discharge expected. (3600 CF of volume per acre of drainage area as a rule of thumb).

Contractor's attention is also directed to the contract drawings for additional temporary erosion control measures.

Stabilization Practices:
Temporary Stabilization - Topsoil stockpiles, earth berms, and disturbed portions of the site where construction activity temporarily ceases for at least 14 days will be stabilized with temporary seed. Areas seeded between May 15 and August 15 shall be covered with hay or straw mulch, as per the NHDES Stormwater Manual (2 bales per 1000 sf). Temporary seeding shall occur prior to September 15. Temporary seeding should be inspected weekly and after any rainfall exceeding 0.25 inches in 24 hours on active sites. Temporary seeding shall be inspected just prior to September 15 to ascertain whether additional seeding is required to provide stabilization over the winter period. Seed selection shall be in accordance with the NHDES Stormwater Manual, Vol. 3, Table 4-1 (pg. 58), see also Erosion and Sediment Control Note 12, this sheet.

Permanent Stabilization - Disturbed portions of the site where construction activities have permanently ceased will be stabilized with permanent seed or base gravels no later than 3 days after the last construction activity. Permanently seeded areas shall be inspected at least monthly during the course of construction, and continue until the Owner assumes control of the site. Mow seeded areas to maintain a healthy stand of vegetation. Permanent seeding should be completed 45 days prior to the first killing frost. If the disturbed area hasn't demonstrated 85% vegetative cover by October 15, temporary stabilization measures shall be implemented for overwinter protection, and permanent seed stabilization will be completed during the next growing season. Seed selection shall be a Type C mixture in accordance with the NHDES Stormwater Manual, Vol. 3, Tables 4-2 and 4-3 (pg. 65,66), see also Erosion and Sediment Control Note 13, this sheet.

Other Controls:
Staging Area - Perimeter shall be encircled with silt fencing, and care will be taken to secure material (see Spill Prevention notes, this sheet).

Hauling - Dump trucks importing or removing materials from the construction site will be covered with a tarpaulin.

Concrete Trucks - Concrete trucks will conduct washout and discharge excess concrete to an onsite temporary retention basin. Once hardened, the material will be removed and lawfully disposed of offsite. Coordinate basin location in the field with the Owner and Engineer, away from surface waters, drainage inlets, and natural resources.

Waste Materials - All construction waste materials will be collected and stored in a covered metal vessel provided by the solid waste management company contracted for this project. The container shall be emptied a minimum of once per week. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste separation and disposal. Notices stating these practices will be posted in the office trailer and the construction superintendent will be responsible for seeing that these procedures are followed.

Hazardous Waste: All hazardous waste materials will be disposed of according to local or State regulations or per the manufacturer. Site personnel will be instructed in these practices and the construction superintendent will be responsible for ensuring compliance.

Sanitary Waste: All sanitary waste will be collected from the portable units by a sanitary waste management contractor, licensed in the State of New Hampshire, as frequently as required by local regulations or usage.

Dust Control - The haul roads and construction site subject to vehicle traffic and activities will be treated with water applications to restrict blowing and movement of dust particles. Where construction activity temporarily ceases for at least 3 days, or where continued treatment is not feasible following temporary termination of activities, temporary vegetation or mulching will be utilized.

Offsite Vehicle Tracking - A stabilized construction exit shall be provided to help reduce vehicle tracking of sediments offsite. The paved street adjacent to the site entrance will be swept daily, as frequently as required, to remove any excess mud, dirt, or rock tracked from the site.

Non-Storm Water Discharges - It is anticipated that the following non-storm water discharges will occur from the site during the construction period:
- -Water from water line flushings
- -Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred)
- -Equipment wash waters (excluding concrete truck washouts)
- -Uncontaminated groundwater from dewatering excavation

All non-storm water discharges will be directed to a sediment basin prior to discharge.

Maintenance:
The inspection and maintenance schedule shall be followed throughout the year, with repairs/maintenance performed as required. In the spring, the Contractor shall inspect all stabilized areas, and repair damages and bare spots.

SPILL PREVENTION

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Good Housekeeping - The following practices will be followed onsite during the construction project:
Store only enough product required to do the job
All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
Products will be kept in their original containers with the original manufacturer's label.
Substances will not be mixed with one another unless recommended by the manufacturer.
Whenever possible, all of a product will be used up before disposing of the container.
Manufacturers' recommendations for proper use and disposal will be followed.
The site superintendent will inspect the area daily to ensure proper use and disposal of materials onsite.

Hazardous Products - These practices are used to reduce the risks associated with hazardous materials:
Products will be kept in original containers unless they are not resealable.
Original labels and material safety data sheets will be retained; they contain important product information.
If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

Product Specific Practices - The following product specific practices will be followed onsite:
Petroleum Products - All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any fuel storage tanks stored onsite shall have secondary containment. Any asphalt substances used onsite will be applied in accordance with the manufacturer's recommendations.

Fertilizer Management - Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer, in compliance with NHDES, and the Shoreland Water Quality Protection Act. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints - All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to any storm sewer system or direct to the ground but will be properly disposed of according to manufacturers' instructions and/or State and local regulations.

Spill Control Practices - In addition to the practices previously discussed, the following practices will be followed for spill prevention and cleanup:
Manufacturers' recommended methods for spill cleanup will be clearly posted and the General Contractor will be responsible for ensuring site personnel are aware of the procedures and the location of the information and cleanup supplies.

Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

All spills will be cleaned up immediately upon discovery.

The spill area will be kept well-ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the spill size.

The spill prevention plan will be adjusted to include measures to prevent this type of spill from recurring, and how to clean up the spill if there is another. A description of the spill, what caused it, and the cleanup measures taken will also be included.

The construction superintendent responsible for day-to-day site operations will be the spill prevention and cleanup coordinator. He/she will designate other site personnel who will receive spill prevention and cleanup training. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.

Contact Information: In the event of a spill, the following agencies should be contacted, in the order listed below-
Hazardous Waste Spill
1. Local fire department 603-225-8650. NHDES Emergency Response Group 603-271-3899 (M-F, 8-4)
3. NH Dept. of Safety 603-223-4381 (24 hrs/day)

Petroleum Spill
1. NHDES Emergency Response Group 603-271-3899 (M-F, 8-4)
2. NH Dept. of Safety 603-223-4381 (24 hrs/day)

WINTER CONSTRUCTION NOTES

TO PROTECT WATER QUALITY DURING COLD WEATHER AND DURING SPRING RUNOFF, THE STABILIZATION TECHNIQUES SPECIFIED HEREIN SHALL BE EMPLOYED BETWEEN OCTOBER 15 AND MAY 15.

1. Winter construction shall be conducted such that no more than 1 acre of the site is destabilized at any one time. The exposed area should be limited only to those areas in which work will occur during the following 15 days and that can be mulched in one day prior to any snow or rainfall event. Subsequent work areas should not be exposed until the previously exposed work area has been fully stabilized. Double rows of sediment barriers will be placed between any natural resource (wetlands, streams) and the disturbed area. During frozen conditions, erosion control mix berms or stump grinding barriers may be used if silt fence installation is not possible. After each day of final grading, the area shall be properly stabilized with anchored hay or straw, or erosion control matting (see notes 4 and 6 below). All erosion control measures shall be in place prior to any thaw or spring melt event.

2. An area is considered exposed until stabilized with gravel base for a road or parking area, pavement, vegetation, mulching, erosion control mix, erosion control mats, or riprap.

3. All erosion and sediment control measures installed for the project should have routine maintenance and cleaning completed, and should be inspected and repaired as needed in preparation for the construction season. Temporary embankments should be fully vegetated or otherwise stabilized by accepted methods.

4. All proposed vegetated areas that do not exhibit a minimum of 85% vegetative growth by October 15, or which are disturbed after October 15, shall be stabilized by seeding and installing erosion control blankets on slopes greater than 3:1, and seeding and placing 3 to 4 tons of mulch per acre, secured with anchored netting, elsewhere. The installation of erosion control blankets or mulch and netting shall not occur over accumulated snow or on frozen ground and shall be completed in advance of thaw or spring melt events.

5. Installation of anchored hay mulch or erosion control mix shall not occur over snow greater than 1-inch in depth. Installation of erosion control blankets shall not occur over snow greater than 1-inch in depth or on frozen ground. All mulch applied during winter should be anchored.

6. All stone-covered slopes must be constructed and stabilized by October 15.

7. Stockpiles of soil materials should be mulched for over-winter protection with hay or straw at twice the normal rate or with a four-inch layer of erosion control mix. Mulching should be done within 24 hours of stocking, and re-established prior to any rainfall or snowfall. No soil stockpile should be placed within 100 feet from any wetland or other water resource area.

8. Frozen materials should be stockpiled separately and in a location that is away from any area needing to be protected.

9. All grass-lined ditches and channels should be constructed and stabilized by September 1. All ditches or swales which do not exhibit a minimum of 85% vegetative growth by October 15, or which are disturbed after October 15, should be stabilized temporarily with stone or erosion control blankets appropriate for the design flow conditions, as determined by a Professional Engineer or a Certified Professional in Erosion and Sediment Control (CPESC). If a stone lining is necessary, the contractor may need to regrade the ditch as required to provide adequate cross-section after allowing for placement of stone.

10. All stone-lined ditches and channels must be constructed and stabilized by October 15.

11. After November 15, incomplete road or parking areas where work has stopped for the winter season shall be protected with a minimum 3-inch layer of crushed gravel (NHDOT 304.3).

12. Sediment barriers (filter logs) that are installed during frozen conditions should consist of erosion control mix berms, or continuous contained berms. Silt fences and hay bales should not be installed when frozen conditions prevent proper embedment of these barriers.

TURNER GROUP

The H.L. Turner Group Inc.

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

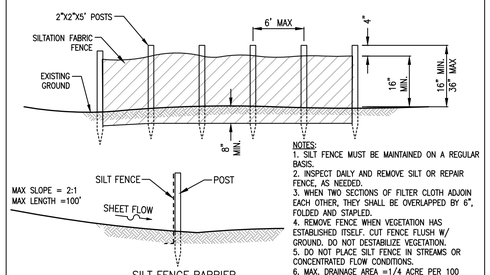
PROJ. NO.:	5175	STAMP
SCALE:	AS NOTED	
DESN. BY:	JAB	
DRAWN BY:	AGL	
CHKD BY:	JAB	
ISSUE DATE:	10/22/2021	

REVISIONS

SHEET TITLE:

TEMPORARY EROSION CONTROL NOTES

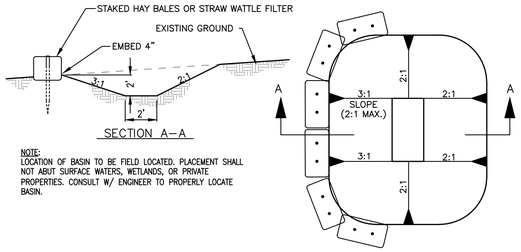
TEC1



SILT FENCE BARRIER

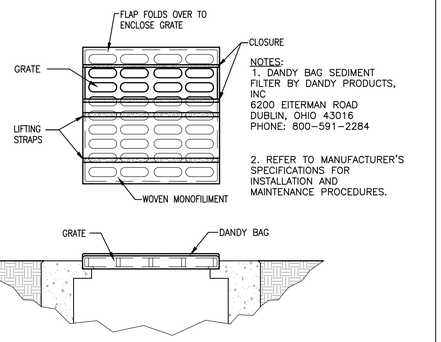
NOTES:
1. SILT FENCE MUST BE MAINTAINED ON A REGULAR BASIS.
2. INSPECT DAILY AND REMOVE SILT OR REPAIR FENCE, AS NEEDED.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6", FOLDED AND STAPLED.
4. REMOVE FENCE WHEN VEGETATION HAS ESTABLISHED ITSELF. CUT FENCE FLUSH W/ GROUND. DO NOT DESTABILIZE VEGETATION.
5. DO NOT PLACE SILT FENCE IN STREAMS OR CONCENTRATED FLOW CONDITIONS.
6. MAX. DRAINAGE AREA =1/4 ACRE PER 100 LINEAR FEET OF SILT FENCE.
7. REMOVE COLLECTED SEDIMENT WHEN IT REACHES ½ THE HEIGHT OF THE FENCE.

1 | TEC2 C1 — TYPICAL SILT FENCE DETAIL
SCALE: NONE



NOTE:
LOCATION OF BASIN TO BE FIELD LOCATED. PLACEMENT SHALL NOT ABUT SURFACE WATERS, WETLANDS, OR PRIVATE PROPERTIES. CONSULT W/ ENGINEER TO PROPERLY LOCATE BASIN.

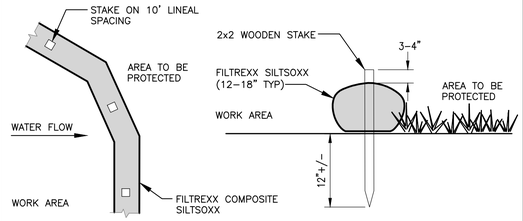
2 | TEC2 C1 — CONCRETE TRUCK WASHOUT BASIN
SCALE: NONE



NOTES:
1. DANDY BAG SEDIMENT FILTER BY DANDY PRODUCTS, INC
6200 EITERMAN ROAD
DUBLIN, OHIO 43016
PHONE: 800-591-2284

2. REFER TO MANUFACTURER'S SPECIFICATIONS FOR INSTALLATION AND MAINTENANCE PROCEDURES.

3 | TEC2 C1 — CATCH BASIN SEDIMENT FILTER
SCALE: NONE



PLAN VIEW SECTION VIEW

NOTES:

1. ALL MATERIAL TO MEET FILTERSOXX SPECIFICATIONS.

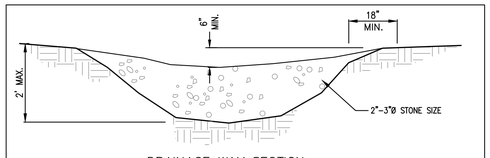
2. FILTERSOXX COMPOST/SOIL/RODK/SEED FILL TO MEET APPLICATION REQUIREMENTS.

3. SILTSOXX DEPICTED IS FOR MINIMUM SLOPES. GREATER SLOPES MAY REQUIRE LARGER SOCKS PER THE ENGINEER.

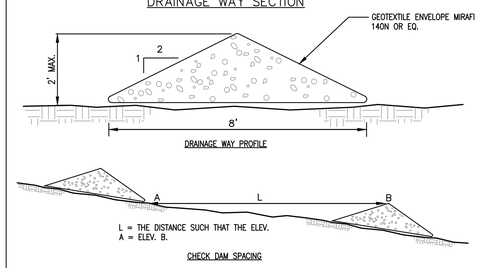
4. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

4 | TEC2 4 — SILTSOXX DETAIL
SCALE: NONE

C1004F



DRAINAGE WAY SECTION



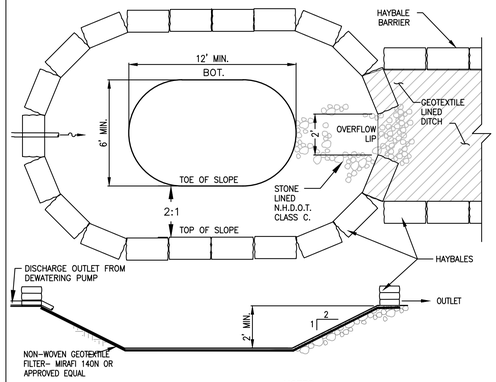
NOTES:

1. KEY STONE INTO CHANNEL BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 18" TO PREVENT FLOW AROUND DAM.

2. CHECK DAMS SHALL NOT BE PLACED IN FLOWING STREAMS.

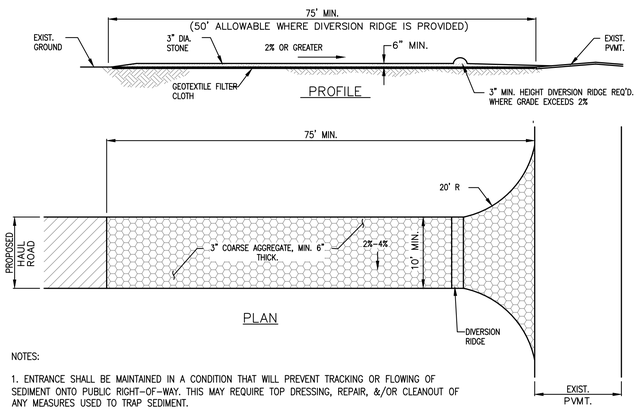
3. STONE SHALL BE WELL-GRADED ANGULAR 2–3" DIAMETER.

5 | TEC2 C1.1 — TEMPORARY STONE CHECK DAMS
SCALE: NONE



NOTES:
1. LOCATION OF BASIN TO BE FIELD LOCATED. CONSULT W/ ENGINEER TO PROPERLY SIZE & LOCATE BASIN (3600 CF PER ACRE OF DRAINAGE AS A RULE OF THUMB).
2. CONTRACTOR MAY USE FILTER LOGS IN LEIU OF HAYBALES WHERE INDICATED ON THIS DETAIL.

6 | TEC2 C1 — DEWATERING SEDIMENT BASIN
SCALE: NONE



NOTES:

1. ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR, &/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.

2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.

3. WHEN WASHING IS REQ'D, IT SHALL BE DONE ON AN AREA STABILIZED W/ CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

4. PUBLIC RIGHT-OF-WAY SHALL BE KEPT CLEAR OF OFF-TRACKED SEDIMENT. STREET SWEEPING SHALL OCCUR NO LESS THAN ONCE PER DAY WHILE CONSTRUCTION IS ONGOING.

11 | TEC2 C1 — STABILIZED CONSTRUCTION EXIT
SCALE: NONE

TURNER GROUP

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PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	AS NOTED
DESN. BY:	JAB
DRAWN BY:	AGL
CHKD BY:	JAB
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STAMP

REVISIONS

SHEET TITLE:
TEMPORARY EROSION CONTROL DETAILS

TEC2

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ABBREVIATION	DEFINITION
A	
ADJ	ADJUSTABLE
AFF	ABOVE FINISH FLOOR
AESS	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL
ACM	ASBESTOS CONTAINING MATERIAL
ALT	ALTERNATE
ALUM	ALUMINUM
AMD	ACOUSTICAL METAL DECKING
B	
BM	BEAM
BLKG	BLOCKING
BRK	BRICK
BLDG	BUILDING
BO	BY OWNER
C	
CFMF	COLD FORM METAL FRAMING
CLR	CLEAR DIMENSION
CONC	CONCRETE
CMU	CONCRETE MASONRY UNIT
CONT	CONTINUE (OUS)
CONTR	CONTRACTOR
CJ	CONTROL/CONSTRUCTION JOINT
CRS	COURSES
D	
DBL	DOUBLE
DEMO	DEMOLITION
DN	DOWN
DTL	DETAIL
DWG	DRAWING
E	
EA	EACH
EJ	EXPANSION JOINT
ELEC	ELECTRIC (AL)
ELEV	ELEVATION
E.O.D.	EDGE OF DECK
EQ	EQUAL
ETR	EXISTING TO REMAIN
E.W.	EACH WAY
EXIST or (e)	EXISTING
EXPSTR	EXPOSED STRUCTURE
EXT	EXTERIOR
F	
FIN	FINISH (ED)
FINFL.	FINISH FLOOR
F.F.	FINISH FLOOR
FND	FOUNDATION
F.O.W.	FACE OF WALL
FR	FRAME (D) (ING)
FRT	FIRE TREATED
FTG	FOOTING
FUT	FUTURE
FXD	FIXED

ABBREVIATION	DEFINITION
G	
GA	GAUGE
GV	GALVANIZED
GALV	GALVANIZED
GWB	GYPSUM WALL BOARD
GYP	GYPSUM
H	
HDWD	HARD WOOD
H	HEIGHT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
I	
I.F.	INSIDE FACE
I.J.	ISOLATION JOINT
IN	INCH (ES)
ID	INSIDE DIAMETER
INS	INSULATE (D) (ION)
INSUL	INSULATE (D) (ION)
INT	INTERIOR
L	
L	ANGLE
LF	LINEAR FOOT
LTL	LINTEL
M	
MAS	MASONRY
MAT	MATERIAL (S)
MATL	MATERIAL (S)
MAX	MAXIMUM
MECH	MECHANICAL
MFR	MANUFACTURER
MO	MASONRY OPENING
MTL	METAL
MISC	MISCELLANEOUS
N	
NIC	NOT IN CONTRACT
NBN	NUMBERED NOTE
NTS	NOT TO SCALE
NWRK	NO WORK
O	
O.C.	ON CENTER
O.F.	OUTSIDE FACE
OH	OVER HEAD
OSB	ORIENTED STRAND BOARD

ABBREVIATION	DEFINITION
P	
PAF(S)	POWDER ACTUATED FASTENINGS
PNT	PAINT (ED)
P.T.	PRESSURE TREATED
PWD	PLYWOOD
R	
REF	REFERENCE
RD	ROOF DRAIN
RMV	REMOVE (D) (ABLE)
RO	ROUGH OPENING
S	
SAFB	SOUND ATTENDING FIBERGLASS BATTS
SF	SQUARE FOOT
SLG	SALVAGED
S.O.G.	SLAB ON GRADE
STL	STEEL
ST, STO	STORAGE
SUSP	SUSPENDED
T	
T&B	TOP AND BOTTOM
TCX	TOP CHORD EXTENSION
T&G	TONGUE AND GROOVE
THRM	THERMAL(LY) BREAK(BROKEN)
TYP	TYPICAL
U	
U.N.O.	UNLESS NOTED OTHERWISE
V	
VB	VAPOR BARRIER
VERT	VERTICAL
V.I.F.	VERIFY IN FIELD
VR	VAPOR RETARDER
W	
W	WIDTH
W/	WITH
WD	WOOD
WWF/WWM	WELDED WIRE FABRIC/MESH
SYMB	
@	AT
#	NUMBER OR POUNDS

GENERAL NOTES:

1. All material and workmanship shall conform to the requirements of the 2015 International Building Code.
2. Do not scale from the drawings. If a required dimension is not provided, consult the architect/engineer.
3. If any of the work to be done as shown on the drawings does not correspond with the existing field conditions, contact the architect/engineer prior to proceeding with the work in question.
4. The contractor shall verify all dimensions, elevations and site conditions prior to the start of construction. If there are any discrepancies, consult the architect/engineer prior to proceeding with the work in question.
5. Where a construction detail is not shown or noted, the detail shall be the same as for other similar work.
6. The contractor shall determine the location of utility services in the area to be excavated, before beginning excavation.
7. No pipes, ducts, sleeves, chases, etc., shall be placed in slabs, beams or walls, nor shall any structural members be cut for pipes, ducts, etc., except as shown on the drawings. The contractor shall obtain prior approval for the installation of any additional pipes, ducts, etc.
8. These drawings represent the finished structure and do not indicate the method of construction. The contractor is responsible for all temporary bracing, shoring and support necessary to achieve the finished structure. The contractor is responsible for determining and enforcing all construction load limits on the structure.
9. Any mechanical units, other equipment and/or special loading that effects the framing and the structural engineer is aware of are shown on structural drawings. If the mechanical units, equipment and/or special loading conditions are not shown on the drawings, it is to be assumed that the structural engineer is not aware of them. Notify the architect/engineer of any mechanical units, other equipment and/or special loading that is not shown on the structural drawings.
10. All sections and details marked typical or not referred to a specific location shall be considered typical for all similar conditions.
11. The interior walls shown as non-bearing are shown for reference only unless otherwise noted. Refer to the architectural plans for interior non-bearing wall location and types.

REINFORCED CONCRETE NOTES:

1. All concrete work shall be in compliance with the 2015 International Building Code, Chapter 19, "CONCRETE" ACI 301 "Specifications for Structural Concrete for Buildings" and ACI 318 "Building Code Requirements for Reinforced Concrete and Commentary" except as modified by these notes.
2. Cement shall conform to ASTM C150, Type II.
3. Ready-mix concrete shall be mixed and delivered in accordance with ASTM C94.
4. All concrete shall have a minimum 28 day compressive strength as follows:
   Footings & Walls 3000 psi
   Slab-on-Grade 3500 psi
5. The concrete shall be placed with a maximum 4" slump and shall be vibrated in a workman like manner.
6. The concrete for the footings shall be air entrained concrete, containing 4% to 8% entrained air.
   The concrete for the floor slab shall be non-air entrained.
7. Admixtures may be used with prior approval of the engineer. Admixtures shall comply with ASTM C494.
8. The concrete shall be mixed, placed and cured without the use of calcium chloride. The placement of all concrete shall comply with the latest American Concrete Institute (ACI) codes, including ACI 306.1-88 "Cold Weather Concreting" and ACI 305R-91 "Hot Weather Concreting".
9. The concrete shall have attained at least fifty percent (50%) of its 28 day compressive strength prior to the removal of the forms.
10. No conduit placed in a concrete slab shall have an outside diameter greater than 1/3 the thickness of the slab. No conduit shall be embedded in a slab that is less than 3" thick. Except for conduit intersections, the minimum clear distance between conduits shall be 6"
11. Projecting corners of slabs, beams, walls, columns, etc., shall be formed with a 3/4" chamfer.
12. Refer to drawings of other disciplines for molds, grooves, clips, ornaments, or grounds required to be cast into the concrete.
13. The contractor shall submit concrete mix designs for review and approval before batching, transporting and placing concrete.
14. Elastomeric joint sealant to be one component, premium grade polyurethane based, moisture cured, non-sag, elastomeric sealant such as Sikaflex - 1A by Sika Corporation or approved equal.
15. Control joints shall be placed in all concrete slabs. The depth of the control joints shall be the 1/4 the slab thickness. Joints shall placed on the plan. Align control joints with beam and column grid lines.

REINFORCING STEEL:

1. All reinforcing steel to be grade 60 and shall conform to the standards in ASTM A615. All reinforcing shall be bent cold.
2. Welded wire fabric (WWF) shall be in accordance with ASTM A185 and shall be lapped 12" minimum.
3. Minimum lap splices of reinforcing bars shall be as follows;
   Concrete - Class B as defined in ACI 318.
4. Prior to ordering any reinforcing steel, provide a set of shop drawings to the engineer of record for review and approval. Submit one set of prints and one set of reproducible plans. Shop drawings must be thoroughly reviewed and found acceptable by the general contractor/construction manager prior to submission to the engineer. Reproduction of the contract documents for use as shop drawings is not acceptable. The shop drawings shall clearly indicate all sizes and spacings for reinforcing. Reinforcing shall be detailed in accordance with ACI 315-92 "Details and Detailing of Concrete Reinforcement" and the Concrete Reinforcing Steel Institute "Manual of Standard Practice", latest edition. No reinforcing shall be ordered or placed without shop drawings approved by the engineer of record.
5. Reinforcing steel shall be provided with the following amounts of cover for cast-in-place concrete:
   a. 3" where the concrete is deposited against the ground without the use of a form.
   b. 2" where the concrete may be exposed to the weather.
   c. 1 1/2" in the walls, joists and slabs not exposed to the weather.
6. All reinforcing steel, welded wire fabric, anchor bolts, dowels and inserts shall be well secured in position with wire positioners before placing concrete and grout.
7. Dowels between footings and walls shall be the same grade, size and spacing as the vertical wall reinforcing.
8. Furnish #3 spacer ties at approximately 2'-6" on center in all beams and footings to secure reinforcing in place.

FOUNDATION & SLAB NOTES:

1. Foundations shall be carried to the elevations indicated to obtain a minimum allowable bearing capacity of 3000 pounds per square foot (psf).
2. The finish excavation for the foundation shall be neat and true to line.
3. Foundation excavations shall be kept free of loose material and standing water.
4. If fill is required below the footings, it shall be structural fill. The material shall be well compacted to 95% of maximum dry density per ASTM 1557.
5. All footings shall be placed on undisturbed earth or compacted backfill. All topsoil and any deleterious materials shall be removed before placing any concrete.
6. No footings or foundations shall be placed in water or on frozen ground. The bottom of the footing shall be a minimum of 4'-0" below finish grade.
7. No loading other than finishing equipment and walking loads shall be placed on concrete slabs until the concrete has reached 75% of its 28-day compressive strength. Loads on depressed or thickened slabs shall not be placed until a minimum of 7 days after the concrete was placed.
8. Provide 10 MIL Perminator Vapor Barrier by W.R. Meadows. All joints/seams (both side and end) shall be overlapped a minimum of 6" and taped using 4" wide Perminator tape. All slab penetrations shall be properly sealed and taped. The vapor barrier shall extend up to the top of the footing where the slab abuts the footing.

WOOD FRAMING NOTES:

1. All framing shall be in compliance with the 2015 IBC code chapter 23 "WOOD" and the 2015 International Residential Code (IRC).
2. Unless otherwise noted, all lumber to be spruce - pine - fir No. 1/2 as graded by the NLGA or better. ALL LUMBER FOR EXTERIOR AND BEARING WALL USE SHALL BE FIRE RETARDANT TREATED. The minimum structural properties are as follows;
   Modulus of Elasticity (E) = 1,400,000 psi
   Bending (Fb) = 875 psi
   Shear Parallel to Grain (Fv) = 70 psi
   Compression Parallel to Grain (Fc) = 1100 psi
   Non-Bearing walls may be framed with spruce - pine - fir stud grade lumber. The maximum moisture content of all framing lumber shall be 19%.
3. LVL lumber shall be MICRO=LAM LVL by iLevel or 2.0E CP-Lam by Coastal Forest Products. Parallam PSL by iLevel. All manufacturer's specifications for handling and installation shall be complied with.
4. LVL's are noted on the plans as the total piece size. Single 1 3/4" wide LVL's may be used to make up the piece size. Use and connection together of the single pieces must comply with the manufacturer's specifications.
5. Pressure treated lumber shall be Southern Pine No. 1 or better. All lumber to come in contact with concrete and masonry shall be pressure treated. All fasteners in contact with PT lumber must be hot dipped galvanized or stainless steel.
6. Nailing shall conform to IBC table 2304.9.1.
7. All nails shall be common wire nails except as otherwise indicated. All nails in pressure treated lumber shall be hot dipped galvanized or stainless steel.
8. For nailing joist hangers or any other type of connector, use only "joist-hanger" nails or any other nail approved by the hanger manufacturer. Do not use cement-coated sinkers or roofing nails.
9. Cutting, notching or drilling of structural members shall be permitted only as detailed or approved by the engineer and/or per the BOCA Code.
10. Plywood shall be APA rated sheathing and shall conform to Commercial Products Standard PS 1-95.
11. All bolt heads and nuts bearing on wood shall have standard cut washers. All bolt holes in wood shall be drilled 1/32" diameter larger than normal bolts diameters.
12. Bolts in wood shall be not less than 7 diameters from the end and 4 diameters from the edge of members.
13. Provide blocking or bridging per recommendations of IBC and as shown on the drawings.
14. Top plates of all wood stud walls to be 2 - 2 x (same width as studs), lapped 48" (minimum), with not less than 6 - 16d nails at each lap and not more than 12" between nails.
15. Do not splice members between supports without written approval of the engineer. Finger jointed material is not acceptable without written approval of the engineer.

PREFABRICATED WOOD TRUSS NOTES:

1. All framing shall be in compliance with the 2015 IBC code chapter 23 "WOOD".
2. Truss fabricators are required to be members of the Wood Truss Council of America WTCA). The fabricators are also required to have third party inspection in accordance with Truss Plate Institute (TPI) and IBC chapter 17. Each truss shall be stamped with the TPI approval.
3. Snow, wind and dead loads are to be per the "LOADING" notes and truss loading diagrams on the contract documents. Loading Cases by the truss designer shall be both balanced and unbalanced loads. The truss shall be designed for the load case which produces the higher stresses. Load combinations to be as per IBC section 1605.0 "Combinations of Loads".
4. Unbalanced loading for hip and gable roofs shall be as applied per IBC section 1608 and ASCE section 7.6.
5. All prefabricated trusses to be designed by others. Prior to ordering any trusses, submit to the engineer one (1) set of shop drawings and one (1) set of calculations. The shop drawings shall be stamped by a structural engineer licensed in the State of New Hampshire. No trusses may be fabricated prior to the engineer's approval of the truss design. Along with the shop drawings, provide a copy of the TPI certification or stamp that the truss manufacturing facility has third party inspections by the TPI.
6. All trusses shall be delivered to the site, handled and stored in compliance with the WTCA/TPI Building Component Safety Information (BCSI) publication "Guide to Good Practice for Handling, Installation, Restraining & Bracing of Metal Plate Connected Wood Trusses".
7. Truss bracing shall be in accordance with approved shop drawings and the WTCA/TPI BCSI publication. Bracing top chords and bottom chords shall be installed in accordance with WTCA/TPI BCSI. All bracing shall remain as permanent bracing except the temporary lateral bracing nailed to the top side of the top chords of the trusses. Diagonal braces shall be nailed to the underside of the top chords. Lateral bracing on the top side of the top chord shall be replaced by sheathing.
8. All trusses must be designed for the bearing widths shown on the contract documents. The width of bearing may not be changed without written approval from the engineer of record.
9. For nailing joist hangers or any other type of connector, use only "joist-hanger" nails or any other nail approved by the hanger manufacturer. Do not use cement-coated sinkers or roofing nails.
10. Holes and notches in any framing members are not acceptable without prior approval of the engineer.
11. In lieu of a rigid ceiling, the bottom chords of the trusses must be braced. See the truss shop drawings for bottom chord bracing requirements where there is no hard ceiling. If the shop drawings do not specify a bracing requirement, provide continuous bracing at 24" on center (o.c.).

DESIGN LOADS

Floor Live Load
Offices = 70psf

Snow Load
Ground Snow Load (Sanbornton, NH)(Pg) = 80 psf
Flat Roof Snow Load (Pf) = 56 psf
Exposure Factor (Ce) = 1.0
Importance Factor (I) = 1.0
Thermal Roof Factor (Ct) = 1.0

Dead Load
Based on normal weight concrete and building materials specified

Wind Load
Basic Wind Speed = 110 mph
Exposure Category "C"
Importance Factor (I) = 1.0
Net Wind Uplift On Roofs = 20 psf

Seismic
Site Class = "D"
Occupancy Category II
Spectral Response Coefficient (Sds) = 0.31
Spectral Response Coefficient (Sd1) = 0.14
Seismic Design Category = "C"
Response Modification Coefficient , R = 6.5

The Analysis Procedure Used Was The Equivalent Lateral Force Procedure

INSPECTION AGENTS

NO.	AGENT	FIRM	CONTACT INFORMATION
1	SPECIAL INSPECTOR	TBD	TBD
2	CM/CONTRACTOR/SUB	TBD	TBD
3	TESTING LABORATORY	TBD	TBD
4	STRUCTURAL ENGINEER	HL TURNER GROUP	PM@HLTURNER.COM
5	OTHER	N/A	N/A

SOILS AND FOUNDATIONS

ITEM	AGENT NO.	SCOPE	FREQUENCY	IBC REFERENCE
SHALLOW FOUNDATIONS	1	Inspect bearing surfaces for conformance to the requirements ; Field Density Testing for Compaction with Nuclear Densometere Gauge	Each lift of material ; Each seperate wall > 10 lf. ; Each 100 lf. of wall (MAX.)	N/A
CONTROLLED STRUCTURAL FILL	1	Test material for conformance to specifications or geotechnical report ; Perform laboratory compaction tests in accordance with specifcations to determin optimum water content and maximum dry density ; Provide inspection of installation and perform field density test of the in-place fill in accordance with specification ; Field Density Testing for Compaction Method with Nuclear Densometer Gauge	Each lift of material ; Each seperate wall > 10 lf. ; Each 100 lf. of wall (MAX.) ; Each seperate Slab Area ; Each 2000 sf. of slab (MAX.)	1705.7
DEEP FOUNDATIONS	N/A	N/A	N/A	N/A
OTHER	N/A	N/A	N/A	N/A

CAST IN PLACE CONCRETE

ITEM	AGENT NO.	SCOPE	FREQUENCY	IBC REFERENCE
MIX DESIGN	1 & 4	Review and comment on submittals of mix designs and histories	Each type of concrete ; Confirm at plant upon request	N/A
MATERIAL CERTIFICATION	1 & 2	Review for conformance to specifications	N/A	N/A
REINFORCEMENT INSTALLATION	1, 2, & 4	Review and comment on shop drawing submittals ; Measurement of bar sizes, locations, spacing and clearances ; Visual observation of details, tying procedures, chairs, bolsters, etc	Each Concrete Placement (Pre-Installation)	1705.4.2
POST-TENSIONING OPERATIONS	N/A	N/A	N/A	1705.4.5
BATCHING PLANT	1 & 2	Review plant quality control procedures, batching, and mixing methods	Each Plant Used (Pre-Installation)	1705.4.4
FORMWORK GEOMETRY	1 & 2	Inspect workmenship ; Inspect form sizes	Each seperate wall > 10 lf. ; Each 100 lf. of wall (MAX.)	N/A
CONCRETE PLACEMENT	1 & 2	Observe concrete placement operations ; Verify conformance to specifications including hot weather placement procedures ; Perform slump, density, and air test at point of discharge for compliance with specifications	Each type of Concrete ; Each Delivery Truck ; Each 30 cy. (MAX.)	N/A
CONCRETE PLACEMENT - TEST CYLINDERS	1	Test Cylinders (min. 5)	5 Each Day ; 5 total for every 50 cy. (max.)	N/A
CONCRETE MATERIAL TESTING	1 & 3	Test and evaulate in accordance with the specifications (ie. Compressive Strength)	2 Cylinders @ 7 days ; 2 Cylinders @ 28 days ; Fifth cylinder break if either of above are questionable	N/A
CURING AND PROTECTION	1 & 2	Observe procedures for conformance to specifications	N/A	N/A
CONCRETE FINISH	1 & 2	Visual observation of Alignment , plumbness, level, surface texture and continuity	Each wall ; Each Slab Area	N/A
OTHER	N/A	N/A	N/A	N/A

PRE-FABRICATED WOOD TRUSSES

ITEM	AGENT NO.	SCOPE	FREQUENCY	IBC REFERENCE
MEMBER SIZES	1	Verify chord and web member sizes are in complicance with approved submittal shop drawings.	Once each Truss Type	N/A
MATERIAL GRADING	1	Verify grade of lumber used in trusses are SPF No 1/2 graded by NLGA or greater	N/A	N/A
FABRICATOR CERTIFICATION/QUALITY CONTROL PROCEDURES	1 & 2	Truss manufacturer are members of Wood Truss Council of America (WTCA). Each truss to be inspected by third party in accordance with Truss Plate Institute (TPI) and IBC Chapter 17. Each Truss to be Stamped with TPI approval.	Once per Manufacturer used; Each truss produced	Chapter 17
CONNECTIONS	1	Visual Inspection of Metal Plate connections.	Each Truss	N/A
SHOP DRAWINGS AND FRAMING DETAILS	1 & 4	Provide a set of stamped Shop drawings by an engineer licensed in the State of New Hampshire. Engineer of Record to review and approve drawings and details prior to the fabrication of the trusses. Special inspector to verify placement in field in accordance with the shop drawings.	Once prior to fabrication ; Visual Observation in field.	N/A
LIFT/INSTALLATION, AND STORAGE PROCEDURES	1 & 2	All trusses delivered on site to be handled, stored, and installed in compliance with WTCA/TPI Building Component Safety Information publication "Guide to Good Practice for Handing, Installation, Restraining and Bracing of Metal Plate Connected Wood Trusses."	Continuous Compliance through Erection of Trusses.	N/A
TRUSS BRACING	1 & 2	Truss bracing to be in accordance with approved shop drawings and WTCA/TPI BCSI publication.	Continuous Compliance through Erection of Trusses.	N/A
OTHER	TBD	N/A	N/A	N/A

WOOD FRAMING

ITEM	AGENT NO.	SCOPE	FREQUENCY	IBC REFERENCE
MEMBER SIZES	1 & 2	Verify that members used conform to approved submittals and contract documents	N/A	N/A
MATERIAL GRADING	1 & 2	Verify grade of lumber used in trusses are SPF No 1/2 graded by NLGA or greater	N/A	N/A
FABRICATOR CERTIFICATION/QUALITY CONTROL PROCEDURES	N/A	N/A	N/A	N/A
CONNECTIONS	1 & 2	Verify connections are in compliance with Contract Documents and Manufacturer's specifications	N/A	N/A
FRAMING DETAILS	1	Verify framing details are in compliance with Contract Documents	N/A	N/A
OTHER	N/A	N/A	N/A	N/A

TURNER GROUP

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ARCHITECTS • ENGINEERS • BUILDING SCIENTISTS

BPS Bonnette, Page & Stone

BONNETTE, PAGE & STONE

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Phone 603-524-3411
Fax 603-524-4641

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	As indicated
DESN. BY:	RDP
DRAWN BY:	EJD
CHKD BY:	RDP
ISSUE DATE:	09/23/2021

STAMP

REVISIONS

SHEET TITLE:

STRUCTURAL GENERAL NOTES

S0.1

STRUCTURAL GENERAL NOTES S0.1

1/8" = 1'-0" : 0' 4' 8' 16' 32'
3/32" = 1'-0" : 0' 8' 16' 32' 64'
1/16" = 1'-0" : 0' 8' 16' 32' 64'

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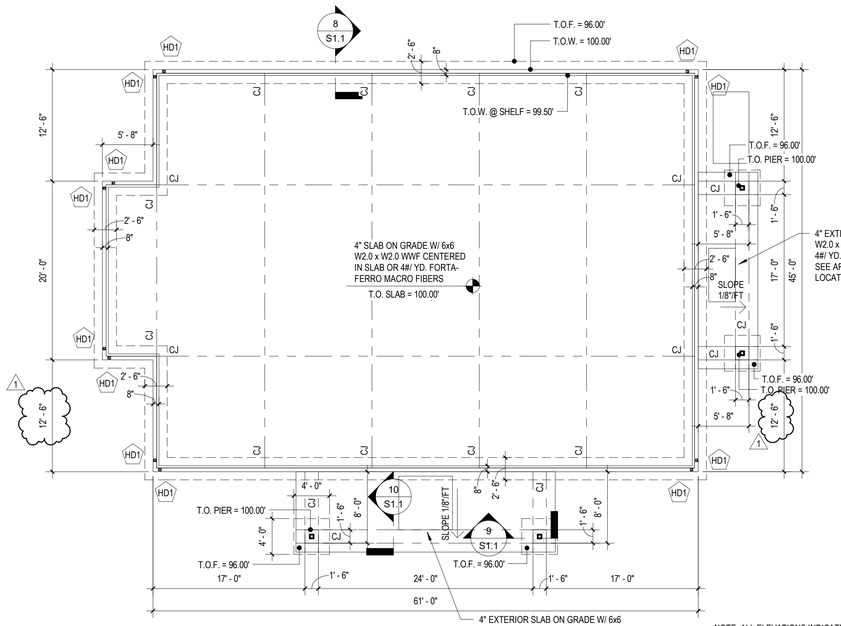
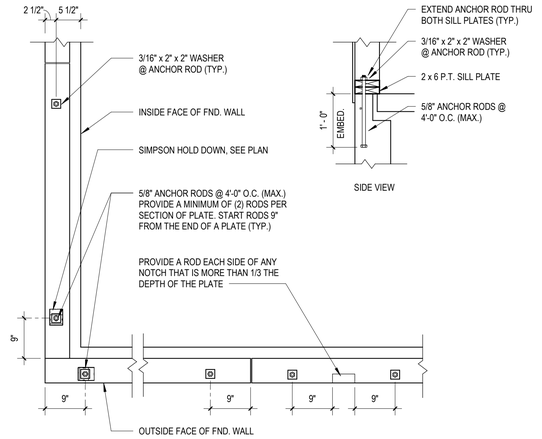
HOLD DOWN SCHEDULE

MARK	HOLD DOWN TYPE	MIN # OF STUDS REQUIRED FOR SIMPSON CONNECTION	ANCHOR ROD TYPE	EMBEDMENT REQUIREMENTS
HD1	SIMPSON HDU 8-SDS2.5	2	5/8" Ø	12"

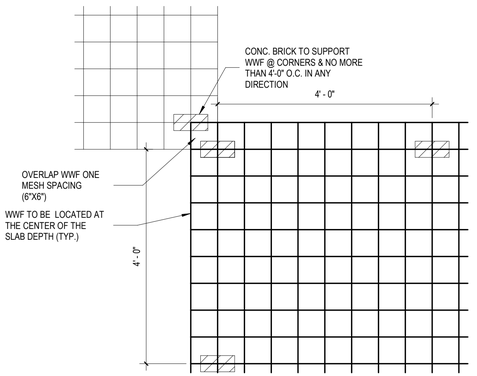


NOTE: ALL ELEVATIONS INDICATED ARE TYPICAL U.O.N.

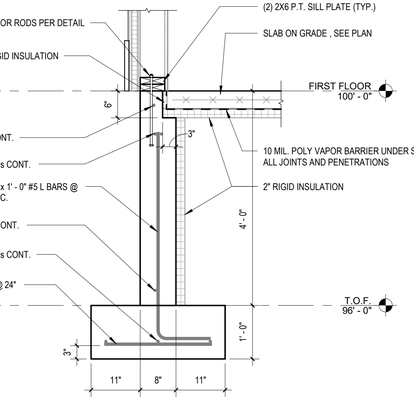
1 S1.1 FOUNDATION & SLAB PLAN
Scale: 1/8" = 1'-0"



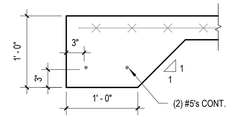
2 S1.1 ANCHOR ROD PLAN
Scale: 3/4" = 1'-0"



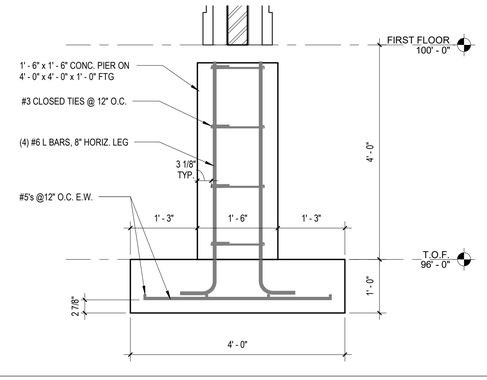
3 S1.1 WIRE MESH SUPPORT
Scale: 3/4" = 1'-0"



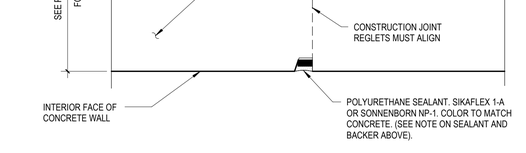
8 S1.1 TYP. FDN. WALL DETAIL
Scale: 3/4" = 1'-0"



10 S1.1 TYP. EXTERIOR SLAB EDGE
Scale: 1" = 1'-0"



9 S1.1 TYP. CONC. PIER DETAIL
Scale: 3/4" = 1'-0"



NOTE:
CORNER REINFORCING SIZE AND SPACING TO MATCH HORIZONTAL REBAR IN WALL AND FOOTING.

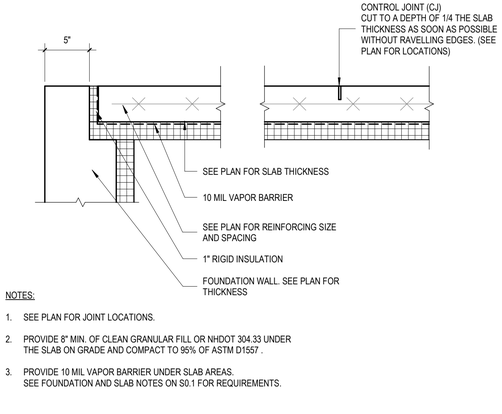
4 S1.1 TYPICAL CORNER REINFORCING
Scale: 3/4" = 1'-0"

SLAB THICKNESS (IN.)	DOWEL SIZE	DOWEL LENGTH (IN.)	DOWEL SPACING (IN.)
4	#4	16"	18" O.C.

NOTE:
DOWEL TO BE PLACED IN SLAB WITHIN 1"± OF HORIZONTAL AXIS

5 S1.1 SLAB ON GRADE CONSTRUCTION JOINT
Scale: 1 1/2" = 1'-0"

6 S1.1 WALL EXPANSION JOINT
Scale: 3" = 1'-0"



NOTES:

1. SEE PLAN FOR JOINT LOCATIONS.
2. PROVIDE 8" MIN. OF CLEAN GRANULAR FILL OR NHDOT 304.33 UNDER THE SLAB ON GRADE AND COMPACT TO 95% OF ASTM D1557 .
3. PROVIDE 10 MIL VAPOR BARRIER UNDER SLAB AREAS. SEE FOUNDATION AND SLAB NOTES ON S0.1 FOR REQUIREMENTS.

7 S1.1 SLAB JOINTS
Scale: 1 1/2" = 1'-0"

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KEY PLAN:

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NEW SANBORNTON TOWN OFFICES
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573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP
SCALE:	As indicated	
DESN. BY:	RDP	
DRAWN BY:	EJD	
CHKD BY:	RDP	
ISSUE DATE:	09/23/2021	

REVISIONS

1	10/20/2021	DIMENSION CHANGES

SHEET TITLE:
FOUNDATION PLAN AND DETAILS

S1.1

FOUNDATION PLAN AND DETAILS
S1.1

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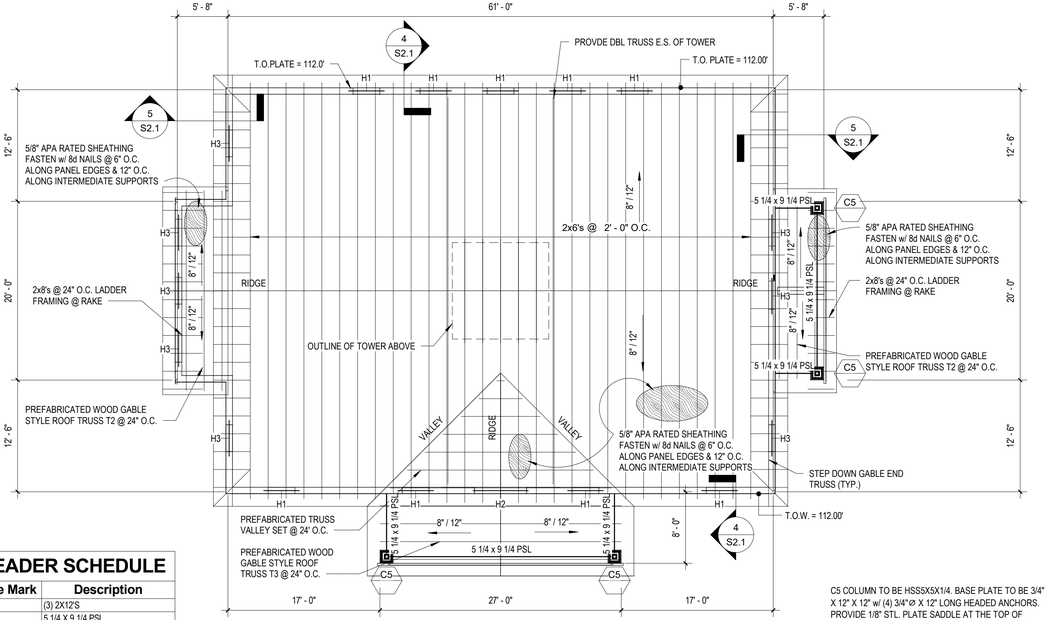
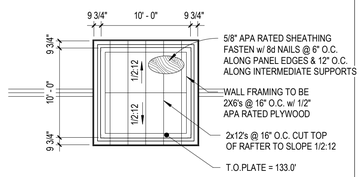
10/25/2021 9:49:15 AM
1/8" = 1'-0"
3/32" = 1'-0"
1/16" = 1'-0"
A B C D E F



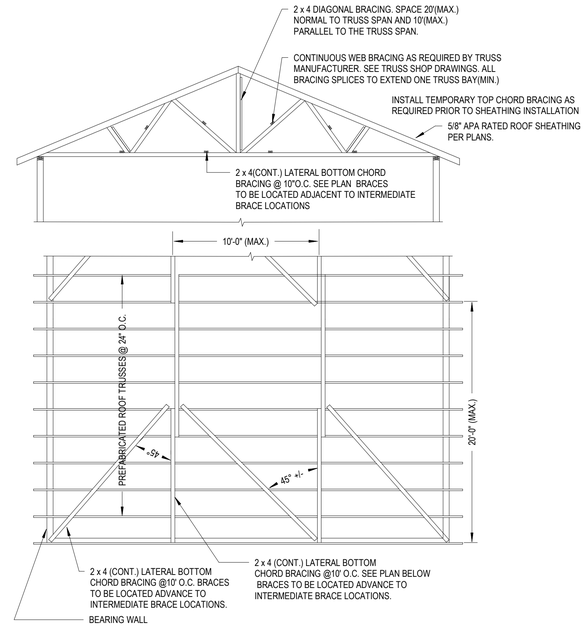
HEADER SCHEDULE

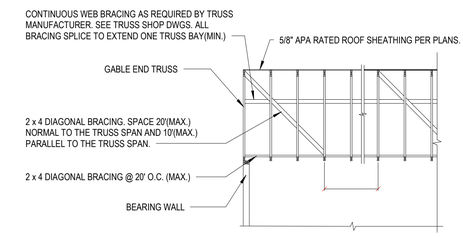
Type Mark	Description
H1	(3) 2X12'S
H2	5 1/4 X 9 1/4 PSL
H3	2X10 BOX HDR

1 S2.1 ROOF FRAMING PLAN
Scale: 1/8" = 1'-0"



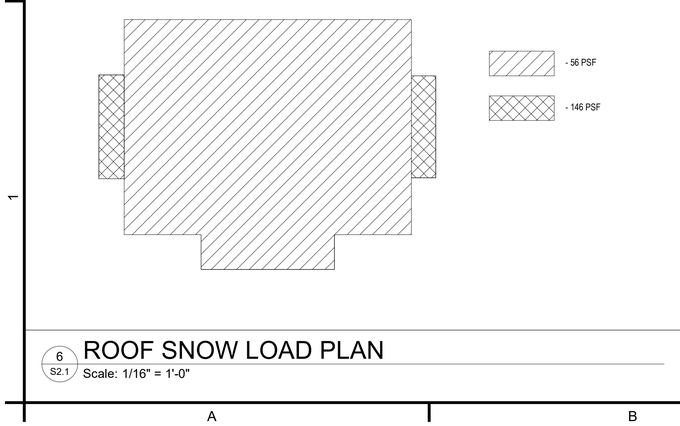
2 S2.1 T.O. PLATE AT TOWER
Scale: 1/8" = 1'-0"



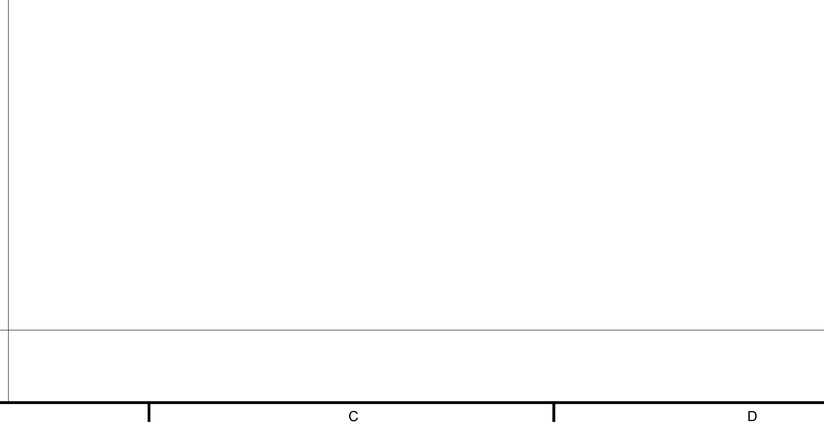


NOTE:
ALL TRUSS BRACING PER WTCA BCSI "GUIDE TO GOOD PRACTICE FOR HANDLING, INSTALLING, RESTRAINING AND BRACING OF METAL PLATE CONNECTED WOOD"

3 S2.1 ROOF TRUSS BRACING
Scale: 3/16" = 1'-0"

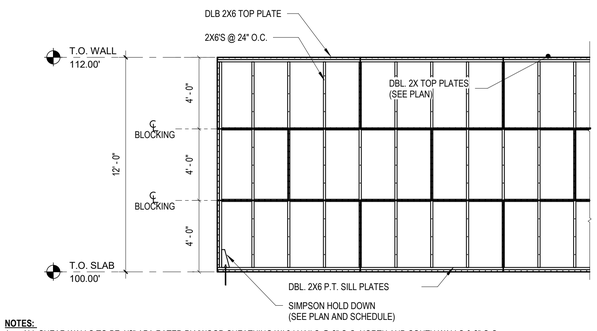


4 S2.1 TYP. ROOF EDGE FRAMING - SECTION
Scale: 1" = 1'-0"



5 S2.1 TYP. RAKE FRAMING - SECTION
Scale: 1" = 1'-0"

6 S2.1 ROOF SNOW LOAD PLAN
Scale: 1/16" = 1'-0"



NOTES:
1. ALL SHEAR WALLS TO BE 1/2" APA RATED PLYWOOD SHEATHING W/ 8d NAILS @ 6" O.C. NORTH AND SOUTH WALLS & 3" O.C. EAST AND WEST WALLS ALONG PANEL EDGES AND 12" O.C. ALONG INTERMEDIATE SUPPORTS.
2. PLYWOOD SHEATHING TO BE PLACED HORIZONTAL AND ALL JOINTS TO BE STAGGERED AS SHOWN ABOVE.
3. BLOCKING TO BE SPACED AT 48" O.C. FOR PANEL ATTACHEMENT AS SHOWN ABOVE.

8 S2.1 SHEAR WALL NAILING DETAIL - ELEVATION
Scale: 1/4" = 1'-0"

TURNER GROUP

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KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	As indicated
DESN. BY:	WDH
DRAWN BY:	AAS
CHKD BY:	WDH
ISSUE DATE:	10/20/2021

STAMP

REVISIONS

SHEET TITLE:
FRAMING PLAN AND DETAILS

S2.1

FRAMING PLAN AND DETAILS
S2.1

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ABBREVIATIONS

A	
ADJ	ADJUSTABLE
AFF	ABOVE FINISH FLOOR
ACM	ASBESTOS CONTAINING MATERIAL
ACT	ACOUSTIC CEILING TILE
ALT	ALTERNATE
ALUM	ALUMINUM
AMD	ACOUSTICAL METAL DECKING
AP	ACCESS PANEL
B	
BM	BEAM
BLKG	BLOCKING
BRK	BRICK
BLDG	BUILDING
BO	BY OWNER
C	
CB	CHALKBOARDS
CFMF	COLD FORM METAL FRAMING
CLG	CEILING
CLR	CLEAR FINISH
CHT	CEILING HEIGHT
CONC	CONCRETE
CMU	CONCRETE MASONRY UNIT
CONT	CONTINUE (OUS)
CONTR	CONTRACTOR
CJ	CONTROL JOINT
CORR	CORRIDOR
CP	CONTROL PANEL
CR	CLASS ROOM
CRS	COURSES
CT	CERAMIC TILE
CWB	CEMENTITIOUS WALL BOARD
D	
DBL	DOUBLE
DEMO	DEMOLITION
DN	DOWN
DTL	DETAIL
DWG	DRAWING
E	
EA	EACH
EDF	ELECTRONIC DRINKING FOUNTAIN
EFM	EXISTING FLOOR MAT
EJ	EXPANSION JOINT
ELEC	ELECTRIC (AL)
ELEV	ELEVATION
EP	ELECTRICAL PANEL
EQ	EQUAL
ETR	EXISTING TO REMAIN
EXIST	EXISTING
EXPSTR	EXPOSED STRUCTURE
EXT	EXTERIOR
F	
FA	FIRE ALARM
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FIN	FINISH (ED)
FINFL,	FINISH FLOOR
F.F.	FINISH FLOOR
FL	FLOORING
FLG	FLASHING
FND	FOUNDATION
FR	FRAME (D) (ING)
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FIRE TREATED
FTG	FOOTING
FUT	FUTURE
FXD	FIXED
G	
GA	GAUGE
GV	GALVANIZED
GALV	GALVANIZED
GL	GLASS, GLAZING
GWB	GYPSUM WALL BOARD
GYP	GYPSUM
H	
HC	HANDICAPPED ACCESSIBLE
HDWD	HARD WOOD
HGT	HEIGHT
HM	HOLLOW METAL
HORIZ	HORIZONTAL
I	
IN	INCH (ES)
INCAND	INCANDESCENT
IAQ	INDOOR AIR QUALITY
ID	INSIDE DIAMETER
INS	INSULATE (D) (ION)
INSUL	INSULATE (D) (ION)
INT	INTERIOR
L	
LAV	LAVATORY
LF	LINEAR FOOT
LTL	LINTEL
M	
MAS	MASONRY
MAT	MATERIAL (S)
MATL	MATERIAL (S)
MAX	MAXIMUM
MB	MARKER BOARD
MDO	MEDIUM DENSITY OVERLAY
MECH	MECHANICAL
MFR	MANUFACTURER
MO	MASONRY OPENING
MTL	METAL
MISC	MISCELLANEOUS
MR	MIRROR
MRGWB	MOISTURE RESISTANT GWB
MUL	MULLION
N	
NIC	NOT IN CONTRACT
NBN	NUMBERED NOTE
NFM	NEW FLOOR MAT
NTS	NOT TO SCALE
NWRK	NO WORK
O	
OH	OVER HEAD
OSB	ORIENTED STRAND BOARD
P	
PAFS	POWDER ACTUATED FASTENINGS
PC	PORCELAIN CERAMIC
PLAM	PLASTIC LAMINATE
PNT	PAINT (ED)
P.T.	PRESSURE TREATED
PWD	PLYWOOD
R	
RCP	REFLECTED CEILING PLAN
REF	REFERENCE
RD	ROOF DRAIN
RMV	REMOVE (D) (ABLE)
RO	ROUGH OPENING
R-PNT	REPAINT
R-CLR	REFINISH CLEAR
S	
SAFB	SOUND ATTENDING FIBERGLASS BATTS
SCT	STRUCTURAL CLAY TILE
SD	STATIC DISSIPATIVE
SF	SQUARE FOOT
SGT	STRUCTURAL GLAZED TILE
SLG	SALVAGED
SP	SPEAKER
SP ED	SPECIAL EDUCATION
SSACT	SUSPENDED SLOPED ACT
STL	STEEL
ST, STO	STORAGE
SUSP	SUSPENDED
SVNL	FIBERGLASS SHEET VINYL
T	
TB	TACK BOARD
TG	TEMPERED GLASS
THRM	THERMALLY BROKEN
TYP	TYPICAL
THRM	THERMALLY BREAK
U	
UH	UNIT HEATER
U.N.O.	UNLESS NOTED OTHERWISE
V	
VCT	VINYL COMPOSITION TILE
VEST	VESTIBULE
VERT	VERTICAL
VIF	VERIFY IN FIELD
W	
WB	WHITE BOARD
WC	WATER CLOSET
W/	WITH
WD	WOOD
WG	WIRE GLASS

SYMBOL LEGEND

ROOM TAG
ROOM NAME
ROOM NUMBER
SQUARE FOOTAGE (IF APPLICABLE)

WALL TYPE

WALL FINISH
RE: A40 SHEETS FOR INTERIOR FINISHES

BUILDING SECTION
SECTION NUMBER
SHEET NO. (WHERE FIRST DRAWN OR CUT)

WALL SECTION
SECTION NUMBER
SHEET NO. (WHERE FIRST DRAWN OR CUT)

DETAIL
SECTION NUMBER
SHEET NO. (WHERE FIRST DRAWN OR CUT)

EXTERIOR ELEVATION
ELEVATION NUMBER
SHEET NO. (WHERE FIRST DRAWN OR CUT)

INTERIOR ELEVATION
ELEVATION NUMBER
SHEET NO. (WHERE FIRST DRAWN OR CUT)

DOOR NUMBER

WINDOW TYPE OR LOUVER TYPE

GRID LINE DESIGNATOR

ELEVATION MATERIAL
COLOR DESIGNATION

MATCH LINE

ENLARGED PLAN

ELEVATION TAG / TARGET

REVISION CLOUD
REVISED AREA
REVISION NUMBER

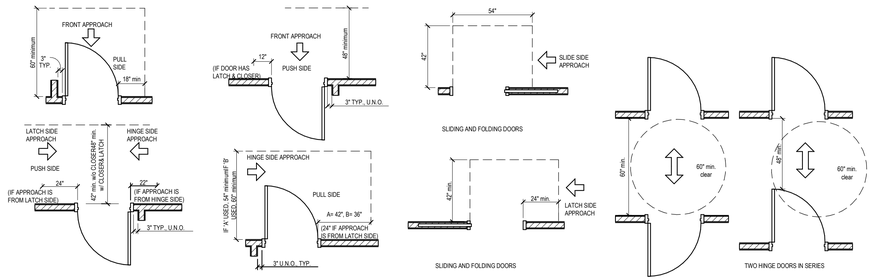
PLAN MATERIAL KEY

UNDISTURBED SOIL
FACE BRICK
CONCRETE MASONRY UNIT
RIGID INSULATION
CONCRETE
STRUCTURAL CLAY TILE OR GLAZED FINISH CMU
DIMENSIONED WOOD (CONTINUOUS)
FINISH WOOD
GYPSUM / PLASTER
FIRE SAFING
EARTH FILL
GRANULAR FILL
LOOSE FILL INSULATION
BATT INSULATION
ALUMINUM
STEEL
WOOD BLOCKING (INTERMITTENT)
PLYWOOD
PLASTICS
SPRAY FOAM INSULATION
VAPOR RETARDER/AIR BARRIER

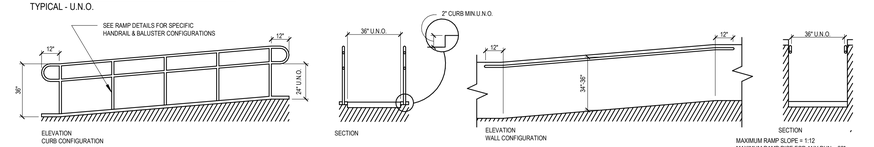
LINE TYPE DESIGNATION KEY

NEW CONSTRUCTION
EXISTING TO REMAIN
DEMOLISHED

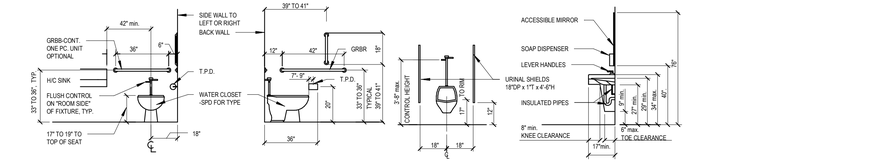
TYPICAL ACCESSIBILITY DETAILS



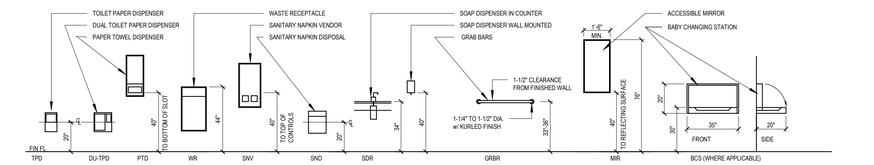
MANEUVERING CLEARANCES AT DOORS
TYPICAL - U.N.O.



ACCESSIBLE RAMP DETAILS
TYPICAL U.N.O. / NTS

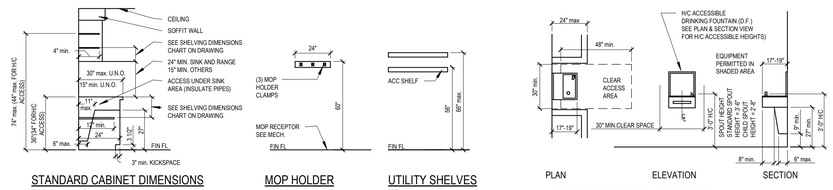


STANDARD ACCESSIBLE RESTROOM ACCESORIES LOCATIONS AND DIMENSIONS
TYPICAL U.N.O. / NTS



PROVIDE (2) LINES OF 2X WOOD BLOCKING ALONG ALL PRESENT AND KNOWN/FUTURE ACCESSORY SUPPORT LOCATIONS. COORDINATE LOCATIONS WITH OWNER, ARCHITECT AND CONTRACTOR UNLESS OTHERWISE NOTED.

RESTROOM DISPENSERS, WASTE RECEPTACLE, AND OTHER MOUNTING HEIGHTS
TYPICAL U.N.O. / NTS

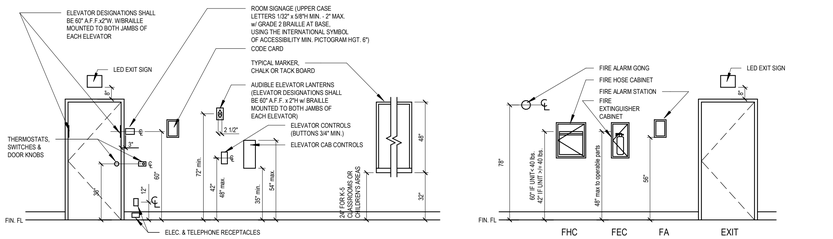


STANDARD CABINET DIMENSIONS
TYPICAL U.N.O. / NTS

MOP HOLDER
MHDR

UTILITY SHELVES
US

ACCESSIBLE DRINKING FOUNTAIN
ACC DF



MISC. MOUNTING HEIGHTS
TYPICAL U.N.O. / NTS

FIRE AND LIFE SAFETY MOUNTING HEIGHTS
TYPICAL U.N.O. / NTS

ELEVATION REFERENCE / KEY

CROSS REFERENCE ELEVATION KEY BETWEEN DISCIPLINES

FIRST FLOOR FINISH ELEVATION:
CIVIL = 100.00' (BASED OFF OF SITE SURVEY)
STRUCTURAL = 100.0' (BASED ON CIVIL DRAWINGS)
ARCHITECTURAL = 100'-0" / 100.00' (BASED ON CIVIL DRAWINGS)

GENERAL NOTES

CONSTRUCTION NOTES:

1. PROVIDE TYPE MOISTURE RESISTANT GYPSUM BOARD AT AREAS ADJACENT TO SINKS, TOILETS, AND OTHER PLUMBING FIXTURES OR WET AREAS UNLESS NOTED OTHERWISE.

2. REFER TO ROOM FINISH SCHEDULE FOR WALL FINISH, FLOOR FINISH, AND BASE INFORMATION UNLESS NOTED OTHERWISE.

3. REFER TO ROOM FINISH SCHEDULE OR REFLECTED CEILING PLANS (IF APPLICABLE) FOR CEILING HEIGHTS AND FINISHES UNLESS NOTED OTHERWISE.

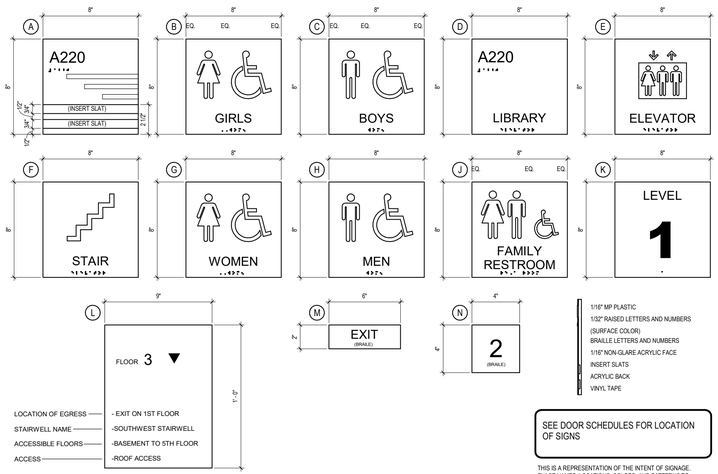
4. ALL DIMENSIONS AT DOORS, WINDOWS, OR OTHER OPENINGS ARE TO CENTERLINE OF OPENING, UNLESS NOTED OTHERWISE.

5. SEE SPECIFICATIONS AND ROOM FINISH SCHEDULE FOR SIGNAGE, CONTROL AND EQUIPMENT FINISH/COLOR DESIGNATIONS UNLESS NOTED OTHERWISE.

6. ALL DISTURBED SITE AREAS TO BE REGRADED, SEEDED, PLANTED, & MULCHED PER PLANS UNLESS NOTED OTHERWISE.

7. ALL REVISED FINAL GRADING TO SLOPE A MINIMUM OF 5 % DOWN AWAY FROM ALL STRUCTURES FOR 6' FROM THE BUILDING PERIMETER UNLESS NOTED OTHERWISE.

ADA SIGNAGE



SEE DOOR SCHEDULES FOR LOCATION OF SIGNS

THIS IS A REPRESENTATION OF THE INTENT OF SIGNAGE. EXACT NAMES, LOCATIONS, COLORS, AND PATTERNS TO BE SELECTED DURING THE SUBMITTAL PROCESS. ARCHITECT TO CHOOSE FROM FULL PRODUCT LINE OF COLORS , PATTERNS AND STYLES.

TURNER GROUP

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Fax 603-524-4641

TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	As indicated
DESN. BY:	RDP
DRAWN BY:	EJD
CHKD BY:	RDP
ISSUE DATE:	10/20/2021

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REVISIONS

SHEET TITLE:
LEGEND & GENERAL INFORMATION

A0.1

LEGEND & GENERAL INFORMATION
A0.1

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1/8" = 1'-0"
3/32" = 1'-0"
1/16" = 1'-0"

OUTLINE SPECIFICATIONS/ MATERIAL LIST

1.1 SUBMITTAL PROCEDURES:

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
   a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams showing factory-installed wiring.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.
3. Submit Shop Drawings in the following format:
   a. PDF electronic file.

D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:
   a. PDF electronic file.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

1.2 DELEGATED-DESIGN SERVICES
A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file, three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

NOTE: THE ARCHITECTURAL DESIGN HAS BEEN COORDINATED AROUND THE FOLLOWING PRODUCTS AND MANUFACTURERS WHICH MEET ESTABLISHED STANDARDS OF QUALITY, DESIGN CRITERIA, PERFORMANCE, AND PHYSICAL SPACE REQUIREMENTS. ACCEPTABLE EQUAL SUBSTITUTIONS REQUIRE APPROVAL OF BOTH THE OWNER AND THE ARCHITECT. CONTRACTOR SHALL FOLLOW ALL MANUFACTURER'S RECOMMENDATIONS AND CONSTRUCTION STANDARDS FOR EXECUTION AND INSTALLATION. PROVIDE SUBMITTALS FOR ALL MATERIALS.

DIV # ITEM / DESCRIPTION

02000 SITEWORK

SEE CIVIL DRAWINGS FOR SPECIFICATIONS.

03000 CONCRETE

SEE STRUCTURAL DRAWINGS FOR SPECIFICATIONS.

04000 MASONRY

NOT USED

05000 METALS

05120 STRUCTURAL STEEL
5.1 SEE STRUCTURAL DRAWING FOR SPECIFICATIONS.

06000 WOODS & PLASTICS

06100 ROUGH CARPENTRY
6.1 MISC. FRAMING AS INDICATED ON DRAWINGS. PROVIDE NON TOXIC PRESSURE TREATED 2X WOOD FRAMING WHERE WOOD IS IN CONTACT WITH CONCRETE, MOISTURE OR ROOFING, SEE STRUCTURAL DRAWINGS.

06105 MISC. CARPENTRY
6.2 MISC. 2X_ FURRING, GROUNDS, NAILERS, BLOCKING, ETC. AS INDICATED ON DRAWINGS.

6.3 EXTERIOR WALL PANELS: 1/2" APA RATED SHEATHING. PRESSURE-TREATED SHEATHING AT BOTTOM 4 FEET OF WALL.

6.4 AIR INFILTRATION BARRIER: AIR & WATER BARRIER, COMMERCIAL GRADE TYVEK BY DUPONT, w/6" MIN. LAP SPLICES & SEAM TAPE.
A. EXTEND BARRIER OVER TOP OF WALL & LAP SPLICE WITH INTERIOR CEILING VAPOR BARRIER.

6.5 EXTERIOR WALL STRAPPING: MIN. 1/2" EASTERN WHITE PINE, INSTALLED VERTICALLY.

6.6 WOOD ROOF DECKING: 5/8" APA RATED T&G PLYWOOD DECKING.

6.7 WOOD WALL FRAMING: SEE STRUCTURAL DRAWINGS.

6.8 WOOD TRUSSES: SEE STRUCTURAL DRAWINGS FOR ROOF TRUSS REQUIREMENTS

06300 EXTERIOR ARCHITECTURAL WOODWORK
6.8 EXTERIOR WOOD TRIM: TO MATCH EXISTING TOWN HALL.
A. SOFFIT BOARDS - WHITE CEDAR, 1X_, #3 OR BETTER, TRANSPARENT STAIN.
B. EXTERIOR TRIM BOARDS - WHITE CEDAR, 1X_ & 5/4X_, #3 OR BETTER, TRANSPARENT STAIN - SEE DRAWINGS FOR SIZES.
C. EXTERIOR CORNICE - WHITE CEDAR, #3 OR BETTER, TRANSPARENT STAIN - SEE DRAWINGS.

06400 EXTERIOR COLUMN COVER
6.9 COMPOSITE FIBERGLASS SPLIT COLUMN ENCLOSURE
A. STYLE "TUSCAN SQUARE", DURACLASSIC MODEL #200DCS BY MELTON CLASSICS, INC.
B. SIZE: 14" SQUARE, 7 5/16" BASE/PLINTH HEIGHT, 18 3/4" PLINTH WIDTH, 4" CAP HEIGHT, 17 7/8" CAP WIDTH.
C. MATERIAL: CAST FIBERGLASS-REINFORCED POLYESTER RESIN AND STONE COMPOSITE, 3/8" TO 5/8" THICKNESS.

06600 INTERIOR ARCHITECTURAL WOODWORK
6.9 WINDOW SILLS/EXTENSION JAMBS/HEAD, JAMB, SILL CASING - CLEAR MAPLE, PROVIDE STAIN SAMPLES.

6.10 CASEWORK & COUNTERTOPS:
A. 3/4" PARTICLEBOARD WITH PLASTIC LAMINATE FACING.
B. SOLID SURFACE COUNTERTOPS BY WILSONART OR APPROVED EQUAL.
C. LOBBY WAINSCOT - ROUGH SAWN MAPLE, BASEBOARD, CHAIRRAIL, & VERTICAL BOARD SIZES AS SHOWN ON DRAWINGS; STAIN TO BE SELECTED.

6.11 LOBBY COUNTERTOP:
A. 1/2" MAPLE VENEER PLYWOOD COUNTERTOP w/1X2 CLEAR MAPLE EDGE TRIM.
B. 3/4" A/C PLYWOOD SUB-COUNTER
C. STUD-MOUNTED STEEL COUNTER SUPPORT BRACKET: 2" X 24" X 1/2" STEEL SUPPORT ARM w/18" MINIMUM USABLE SUPPORT ARM LENGTH, 3" X 14" X 1/4" STEEL MOUNTING PLATE; FLAT BLACK POWDER COAT PAINT.

07000 THERMAL & MOISTURE PROTECTION

07210 BUILDING INSULATION
7.1 BOARD INSULATION
A. FOUNDATION RIGID INSULATION - OWENS CORNING XPS INSULATION, THICKNESS: 2".

7.2 FIBERGLASS INSULATION
A. EXTERIOR WALL INSULATION - CERTAINTEED OPTIMA R-23 BLOWN-IN SYSTEM, IN LOCATIONS AS INDICATED ON DRAWINGS.
B. ATTIC INSULATION - CERTAINTEED INSULSAFE R-60 BLOWN-IN SYSTEM, IN LOCATIONS AS INDICATED ON DRAWINGS.
C. ACOUSTICAL INSULATION: USG THERMAFIBER SAFB, OR APPROVED EQUAL, PROVIDE THICKNESS INDICATED ON DRAWINGS.

7.3 LOW EXPANSION FOAM INSULATION, FOR USE AT WINDOW, DOOR ROUGH OPENINGS.

7.4 LOW EXPANSION FOAM INSULATION, PENETRATIONS THROUGH THE EXTERIOR INSULATION BARRIER OTHER THAN AT WINDOWS AND DOORS.

07272 BARRIERS
7.5 SLAB VAPOR BARRIER: REINFORCED POLYETHYLENE NOT LESS THAN 10 MILS w/MAX. PERM RATING OF 0.1 PERM & MIN. 6" LAP SPLICES w/TAPED SEAMS; SEE DRAWINGS FOR LOCATIONS.

7.6 WALL & CE3ILING VAPOR BARRIER: 6 MIL POLYETHYLENE SHEET MEMBRANE w/MIN. 6" LAP SPLICES & TAPED SEAMS.

07300 ASPHALT SHINGLES
7.7 ASPHALT SHINGLES: CERTAINTEED LANDMARK PREMIUM SHINGLES WITH LIFETIME AND SURE START WARRANTY.

7.8 SELF ADHERED UNDERLAYMENT: WR GRACE ICE & WATER SHIELD OR APPROVED EQUAL.

7.9 ROOFING UNDERLAYMENT: 30# ASPHALT IMPREGNATED FELT.

7.10 RIDGE VENT: CERTAINTEED 12" FILTERED RIDGE VENT w/HURRICANE BAFFLES, WEEP HOLES & END CAPS.

07413 METAL ROOFING
7.11 BASIS OF DESIGN: MBCI, BATTEN-LOK HS SMOOTH PANEL OR APPROVED EQUAL.
A. VERTICAL RIB, SNAP JOINT, STANDING SEAM METAL ROOF PANELS.
B. NOMINAL THICKNESS: 22 GAGE, COATED THICKNESS.
C. PANEL COVERAGE: 16 INCHES.
D. EXTERIOR FINISH: FLUOROPOLYMER TWO-COAT SYSTEM.

7.12 UNDERLAYMENT: HIGH TEMPERATURE RESISTANT PRODUCT.
A. BASIS OF DESIGN: BLUESKIN PE 200 HT OR APPROVED EQUAL.

07463 WOOD SIDING
7.13 EXTERIOR WOOD SIDING:
A. CLAPBOARDS - 6 INCH BEVELED, GRADE A, CLEAR EASTERN WHITE CEDAR, 4 1/2 INCHES TO WEATHER, SOLID WHITE STAIN.
B. SIDING UNDERLAYMENT: 15# ASPHALT IMPREGNATED FELT, ATTACHED TO VERTICAL WOOD STRAPPING.

07620 SHEET METAL FLASHING & TRIM
7.14 PREFINISHED ALUMINUM DRIP EDGE: HICKMAN EXTRUDED ECONO SNAP 3, 6.25" HIGH. COLOR SHALL MATCH EXISTING AND BE FROM MANUFACTURERS STANDARD KYNAR COLOR SELECTION. PROVIDE TWO PIECE EDGE WHERE INDICATED.

7.15 FLASHING TYPE 1 - MISCELLANEOUS KYNAR COATED METAL FLASHINGS AND PANELS.

07920 JOINT SEALANTS
7.16 EXTERIOR SEALANTS: PROVIDE JOINT SEALANTS AS RECOMMENDED BY MANUFACTURER FOR USE INTENDED.
A. SEALANT TYPE 1: EXTERIOR SEALANT, SILICONE, NONSTAINING, S, NS, 100/50, NT. FOR USE AS RECOMMENDED BY MANUFACTURER FOR EXPANSION JOINTS, JOINTS BETWEEN CONCRETE AND OTHER MATERIALS, JOINTS BETWEEN METAL FRAMES AND OTHER MATERIALS, AND OTHER EXTERIOR JOINTS UNLESS OTHERWISE INDICATED OR REQUIRED, COLOR TO MATCH ADJACENT SURFACE.

7.17 INTERIOR SEALANTS:
A. SEALANT TYPE 2: INTERIOR SEALANT, ONE PART SILICONIZED ACRYLIC LATEX, PAINTABLE, FOR USE AS RECOMMENDED BY MANUFACTURER AT INTERIOR WALL AND CEILING JOINTS BETWEEN WINDOWS AND FRAMES, JOINTS BETWEEN DOOR FRAMES AND WALLS, AND ALL OTHER JOINTS UNLESS OTHERWISE INDICATED.
B. SEALANT TYPE 3: TOILET ROOM SEALANT, WATERPROOF SILICONE, COLOR TO MATCH TOILET FIXTURE, FOR USE AT JOINTS BETWEEN TOILET FIXTURES & WALLS, AT JOINTS BETWEEN TOILET FIXTURES & FLOORS, AND AT JOINTS BETWEEN COUNTERTOPS & WALLS.
C. SEALANT TYPE 4: ACOUSTICAL SEALANT, ONE PART ACRYLIC, NEUTRAL CURING ANITARY FOR JOINTS AT TOP AND BOTTOM OF WALLS.
D. SEALANT TYPE 5: FIRE SEALANT, FIRESTOP SEALANT FOR USE AT TOP AND BOTTOM OF WALLS AND PENETRATIONS IN FIRE RATED WALLS.

078433 PENETRATION FIRESTOPPING

A. PERFORMANCE REQUIREMENTS
1. Fire-Test-Response Characteristics:
   a. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
   b. Test per testing standards referenced in "Penetration Firestopping Systems" Article.
   c. Penetration firestopping systems shall bear classification marking of a UL in its "Fire Resistance Directory."

B. PENETRATION FIRESTOPPING SYSTEMS
1. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
   a. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, Hilti.
2. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
   a. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
3. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
4. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
   a. Permanent forming/damming/backing materials.
   b. Collars.
   c. Steel sleeves.

C. FILL MATERIALS
1. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
2. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
3. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

078443 JOINT FIRESTOPPING

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
1. HYPERLINK "http://www.specagent.com/LookUp/?Section=078443&SectionReleaseDate=12/01/2013&DocType=FL&ToolID=1&uid=11855&src=altarix" Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, United States Gypsum (USG).
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

078446 FIRE-RESISTIVE JOINT SEALANTS

A. FIRE-RESISTIVE JOINT SYSTEMS
1. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
2. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:
   a. Joints include those installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies, and roofs or roof/ceiling assemblies.
   b. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
      c. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, Grace Construction Products, Hilti, Inc., 3M Fire Protection Products, USG Corporation.
3. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
4. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

079200 JOINT SEALANTS
A. JOINT SEALANTS, GENERAL
1. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
2. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
3. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

B. NONSTAINING SILICONE JOINT SEALANTS
1. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
2. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

C. URETHANE JOINT SEALANTS
1. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

D. MILDEW-RESISTANT JOINT SEALANTS
1. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
2. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

E. LATEX JOINT SEALANTS
1. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

F. JOINT-SEALANT BACKING
1. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
2. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
3. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

G. MISCELLANEOUS MATERIALS
1. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
2. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
3. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

08000 OPENINGS

08100 HOLLOW METAL DOORS & FRAMES
8.1 CURRIES OR APPROVED EQUAL 18 GA WELDED HOLLOW METAL DOOR FRAMES. EXTERIOR FRAMES GALVANNEALED.
A. INTERIOR FRAMES TO MATCH FIRE RATINGS INDICATED. DOOR THICKNESS 1 3/4 INCHES, MODEL 2 SEAMLESS CONSTRUCTION WITH MINERAL CORE.
1. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. INTERIOR DOORS AND FRAMES
1. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
2. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
   a. Physical Performance: Level B according to SDI A250.4.
   b. Doors: Shall be type as indicated in the Door and Frame Schedule; Thickness: 1-3/4 inches (44.5 mm); Metallic coated face, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm); Model 2, Seamless edge construction; Honeycomb core; Prime exposed finish.
   c. Frames: Shall be Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm); Full profile welded construction; Prime exposed finish.

C. FRAME ANCHORS
1. Jamb Anchors: Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

D. MATERIALS
1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
2. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
3. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
4. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
5. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
6. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
7. Glazing: Comply with requirements in Section 088000 "Glazing."

E. FABRICATION
1. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
2. Hollow-Metal Doors:
   a. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches (3.2 mm in 51 mm).
   b. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
   c. Bottom Edge Closures: Close bottom edges of doors [where required for attachment of weather stripping] with end closures or channels of same material as face sheets.
3. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   a. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   b. Jamb Anchors: Provide number and spacing of anchors as follows:
      1. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame, three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      2. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., four anchors per jamb..
   c. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
      1. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      2 Double-Door Frames: Drill stop in head jamb to receive two door silencers.
4. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
5. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   a. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   b. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
6. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
   a. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
   b Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
   c. Provide loose stops and moldings on inside of hollow-metal work.
   d. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

G. STEEL FINISHES
1. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

08200 FIBERGLASS DOORS & FRAMES
8.2 COMMERCIAL EXTERIOR ENTRY DOORS
A. Aluminum Clad Wood Door and Frame Assembly as manufacturered by Andersen.
1. Exterior Aluminum, AAMA 2604, Color as selected, style as shown on Drawings.
2. Interior Wood, Stain Finish as selected.
3. Manufacturer's standard hardware package, as selected.

08300 WOOD DOORS
8.3 MOHAWK SOLID CORE 5 PLY CLEAR MAPLE WOOD VENEER DOORS.

08710 FINISH HARDWARE
8.4 HARDWARE FOR DOORS:
A. LOCKSETS SHALL BE GRADE 1, LEVER TYPE.
B. CLOSERS AND HOLD OPENS SHALL BE LCN.
C. LOCK CORES, GRANDMASTER KEYED, REMOVABLE CORE, KEYED TO OWNERS SPECIFICATIONS.
D. DOOR HINGES, FULL MORTISE, NONFERROUS, HEAVY DUTY, BALL BEARING; DOOR PULLS, CONCEALED HINGES, AND KICK PLATES SHALL BE IVES HARDWARE.
E. DOOR BOTTOMS, SEALS AND WEATHERSTRIPPINGS SHALL BE NGP.

8.5 MISC. ARCHITECTURAL HARDWARE:
A. FLOOR STOPS HAGER #243F OR #241F OR EQUAL AS REQUIRED, US26D SATIN CHROME
B. ALUMINUM THRESHOLDS, ADA COMPLIANT, RIBBED ALUMINUM WITH THERMAL BREAK, SADDLETYPE, HAGER OR EQUAL, COORDINATE WIDTH OF THRESHOLD WITH EXTERIOR DOOR JAMB WIDTH.

08530 WINDOWS
8.6 EXTERIOR WINDOWS
A. ALUMINUM CLAD WOOD WINDOW FRAMES & SASH, AS MANUFACTURED BY ANDERSEN WINDOWS.
1. RECTANGULAR DOUBLE-HUNG OPERATING SASH, TILT-IN.
2. EXTERIOR ALUMINUM, AAMA 2604, COLOR AS SELECTED, SIZE & STYLE AS SHOWN ON DRAWINGS.
3. INTERIOR WOOD, STAIN FINISH AS SELECTED.
4. FULL DIVIDED LITE w/SPACER BETWEEN GLASS, ARGON LOW E w/GRILLE PROFILE & PATTERN AS SELECTED.
5. MANUFACTURER'S STANDARD HARDWARE, LOCK & KEEPER, 2-SASH LIFTS PER SASH, COLOR & FINISH AS SELECTED.
6. FULL INSECT SCREEN, CHARCOAL FIBERGLASS SCREEN MESH, COLOR AS SELECTED.

8.7 INTERIOR WINDOWS
A. BULLET RESISTANT TRANSACTION WINDOW - Q-TRAN-PD TRANSACTION WINDOW/TRANSACTION DRAWER COMBO BY INTERBANK EQUIPMENT, PH. 1-866-286-4400
A. LEVEL 3 BULLET RESISTANT GLASS AND TRANSACTION DRAWER, AMPLIFIED SPEAK THRU, CLEAR ANODIZED, R.O. 24 5/8" X 38 7/8".

TURNER GROUP

The H.L. Turner Group Inc.

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Concord, New Hampshire 03301
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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP
SCALE:	1 1/2" = 1'-0"	
DESN. BY:	RDP	
DRAWN BY:	EJD	
CHKD BY:	RDP	
ISSUE DATE:	10/20/2021	

REVISIONS

SHEET TITLE:
OUTLINE SPECIFICATIONS

A0.2

OUTLINE SPECIFICATIONS A0.2

1/8" = 1'-0" 32' 16' 8' 4' 0'
3/32" = 1'-0" 64' 32' 16' 8' 0'
1/16" = 1'-0" 64' 32' 16' 8' 0'

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A B C D E F

OUTLINE SPECIFICATIONS/ MATERIAL LIST

088000 GLAZING

A. PERFORMANCE REQUIREMENTS
1. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
   a. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
   b. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
2. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
3. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   a. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
   b. For laminated-glass lites, properties are based on products of construction indicated.
   c. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   d. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
   e. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
   f. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

B. GLASS PRODUCTS
1. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   a. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
2. Safety Glazing Labeling: Permanently mark glazing with certification label of the SGCC Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
3. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
4. Thickness: Provide glass that complies with performance requirements and is not less 6 mm.
5. Strength: Provide fully tempered float glass.
6. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Quality-Q3.

C. INSULATING GLASS
1. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
   a. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
   b. Spacer: Manufacturer's standard spacer material and construction.
   c. Desiccant: Molecular sieve or silica gel, or a blend of both.

D. GLAZING TAPES
1. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 807.3.

E. MISCELLANEOUS GLAZING MATERIALS
1. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
2. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
3. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
4. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

F. FABRICATION OF GLAZING UNITS
1. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
   a. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components; Temperature Change: 120 deg F (67 deg C), ambient.
2. Grind smooth and polish exposed glass edges and corners.

09000 FINISHES

092116 NON-STRUCTURAL METAL FRAMING

A. PERFORMANCE REQUIREMENTS
1. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
2. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

B. FRAMING SYSTEMS
1. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   a. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
   b. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
2. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.
   a. Steel Studs and Runners:
      1. Minimum Base-Metal Thickness: As indicated on Drawings.
      2. Depth: As indicated on Drawings.
   b. Dimpled Steel Studs and Runners:
      1. Minimum Base-Metal Thickness: As indicated on Drawings.
      2. Depth: As indicated on Drawings.
3. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
4. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   a. Minimum Base-Metal Thickness: As indicated on Drawings.

C. AUXILIARY MATERIALS
1. General: Provide auxiliary materials that comply with referenced installation standards.
   a. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
2. Isolation Strip at Exterior Walls: Provide Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

09260 GYPSUM BOARD ASSEMBLIES

9.1 GYPSUM WALLBOARD
A. 5/8" THICK GYPSUM WALLBOARD w/TAPERED EDGES.
B. FIRE RATED GYPSUM WALLBOARD w/TAPERED EDGES:
1. Fire-resistance-rated construction according to ASTM E 119 and UL Assembly Nos. indicated on the Drawings.
2. Interior Gypsum Board: 5/8" thick Type "X", Type "AR" or Firecode Type "C", with long edges tapered and mold resistant score of 10.
3. Interior Trim: galvanized or aluminum-coated steel sheet cornerbeads.
4. Joint Treatment: Paper tape; prefill open joints, rounded or beveled panel edges, and damaged surface areas, using setting-type taping compound.
   a. Embedding tape and first coat on joints, fasteners, and trim flanges, use drying type, all purpose compound.
   b. Second coat, use drying type, all purpose compound.
   c. Third coat, use setting-type, sandable topping compound.
   d. Steel Drill Screws: ASTM C 1002 and ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
C. 1" GYPSUM LINER PANEL.

9.2 BULLET RESISTANT FIBERGLASS PANELS, BASIS OF DESIGN: PROTECTIVE STRUCTURES LIMITED, ALPHRAETTA GA 30004, PH 770-521-8666. WWW.PROTECTIVESTRUCTURES.COM.
A. CORE: 7/16 INCH 4.8 LBS PER SQ. FT.
B. BULLET RESISTANCE: WARRANTIED TO MEET UL 752 LEVEL 3.

9.3 GYPSUM ACCESSORIES
A. MISC. ACCESSORIES AS REQUIRED FOR A COMPLETE FINISHED GYPSUM WALL BOARD FINISH.
B. CORNER BEADS, GALVANIZED STEEL, PAINTED.
C. EDGE TRIM, BEAD TYPE, AS INDICATED.
D. JOINT COMPOUND, TYPE AS RECOMMENDED BY THE WALLBOARD MANUFACTURER.
E. FINISHING TAPE, PAPER OR FIBERGLASS AS RECOMMENDED BY THE GYPSUM WALLBOARD MANUFACTURER FOR THE APPLICATION.

093013 CERAMIC TILING

9.4 PORCELAIN TILE (CT-1): MODULE SIZE 6 X 24 INCHES (WALL) AND 6 X 12 INCHES (BASE).
A. BREAKING STRENGTH: 12-230 LBS. (WALL).
B. THICKNESS: .5 MM (WALL).

9.5 METAL TRIM:
A. BASIS OF DESIGN: SCHLUTER SYSTEMS.
1. SCHEINE EDGE STRIPS TO CAP WALL TILE AT WAINSCOT; INSIDE CORNERS AND OUTSIDE CORNERS RESPECTIVELY.
2. QUADEC- INSTALL AT OUTSIDE CORNERS OF WALL TILE.
3. INDEC – INSTALL AT INSIDE CORNERS OF WALL TILE.
4. DILEX-BT WALL TILE - EXPANSION JOINT UNITS AS REQUIRED.

09510 ACOUSTICAL PANEL CEILINGS

A. PERFORMANCE REQUIREMENTS
1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
   b. Smoke-Developed Index: 450 or less.
2. Fire-Resistance Ratings: Comply with ASTM E 119 and indicate design designations from UL's "Fire Resistance Directory".

B. ACOUSTICAL PANELS, GENERAL
1. Manufacturers: Subject to compliance with requirements, provide products by Armstrong World Industries, Inc., CertainTeed Corp., Chicago Metallic Corporation, or USG Interiors, Inc. - Subsidiary of USG Corporation.
2. Acoustical Tiles: Modular size, 15/16" thick, square edge, 24" x 48", Color White, fire-resistance-rated where indicated in corridors, offices, and other business-type occupancies.
3. Standard Metal Suspension System: direct hung by wire hangers, braces, and ties, with attachment devices sized for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
4. Metal Edge Moldings and Trim: Manufacturer's standard products for edges, penetrations, complying with seismic design requirements, same material and finish as suspension system runners.
5. Acoustical Sealant: Manufacturer's standard, for exposed and concealed joints, nonsag, paintable, nonstaining latex sealant.

09654 RESILIENT FLOORING

SEE INTERIOR FINISH KEY FOR RESILIENT FLOORING SELECTIONS.

9.6 RESILIENT BASE AND ACCESSORIES:

A. Vinyl Base: Group 1, solid, homogeneous, cove style, Thickness 0.125 inch thick, Height 4 inches, Lengths manufacturer's standard coil length, with preformed outside corners and job formed inside corners, color as selected by Owner from manufacturer's standard colors available.

B. Reducer Strips: Critical Radiant Flux Classification of 1, Slip Resistance coefficient of friction of 0.8, Type TS, rubber, vulcanized thermoset, Profile and DImensions as required to meet both heights of flooring, color as selected by Owner from manufacturers standard colors available.

C. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

D. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

E. Floor Polish: Provide protective, liquid floor-polish products if recommended by resilient stair-tread / tile manufacturer.

09680 CARPET

SEE INTERIOR FINISH KEY FOR CARPETING SELECTIONS.

09912 PAINT

9.7 READY MIXED LATEX, FINISH AS INDICATED, BENJAMIN MOORE, SHERWIN WILLIAMS, OR APPROVED EQUAL.
A. EXTERIOR GALVANIZED METAL - SEMI GLOSS, 2 COATS SW DTM COATING B66.
B. EXTERIOR FERROUS METAL - 1 COAT SW PRO CRYL UNIVERSAL PRIMER B66-310; 2 COATS SW PRO INDUSTRIAL ZERO VOC ACRYLIC SEMI GLOSS B66-650.
C. EXTERIOR CELLULAR PVC - 2 COATS SW A-100 EXTERIOR DEEP BASE LOW SHEEN.
D. INTERIOR GYPSUM WALLBOARD - 1 COAT SW HARMONY LOW ODOR INTERIOR LATEX PRIMER, B11; 2 COATS SW HARMONY LOW ODOR INTERIOR LATEX EG-SHEL, B9 SERIES.
E. INTERIOR PAINTED WOOD - 1 COAT SW PROGREEN PREP RITE PRO BLOCK LATEX PRIMER B-51; 2 COATS SW PROGREEN 200 ZERO VOC LATEX EG-SHEL, B20-600.
F. COLOR: SEE INTERIOR FINISH KEY.

10000 SPECIALTIES

10.3 TOILET ACCESSORIES: AS INDICATED ON DRAWINGS BY AMERICAN SPECIALTIES INC OR APPROVED EQUAL.

10.4 FIRE EXTIGUISHERS & CABINETS: JL LARSEN 10 LBS. ABC FIRE EXTINGUISHER WITH SEMI RECESSED VERTICAL DUO FIRE RATED CABINET OR APPROVED EQUAL.

10.5 FIRE EXTINGUISHERS:
A. PERFORMANCE REQUIREMENTS
1. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
2. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
   a. Provide fire extinguishers approved, listed, and labeled by FM Global.

B. PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS
1. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
2. Multipurpose Dry-Chemical Type: UL-rated 10 lbs. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

10.6 PANEL SIGNAGE:
A. PERFORMANCE REQUIREMENTS
1. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for signs.

B. SIGNS
1. Follow Standard Room Sign requirements and configurations. See Door Schedule for sign locations. Refer to drawings Standards for Sign Type Designations.
2. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
   a. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated = to phenolic backing sheet to produce composite sheet.
      1. Composite-Sheet Thickness: 0.125 inch (3.18 mm).
      2. Color(s): As selected by Architect from manufacturer's full range.
   b. Sign-Panel Perimeter: Finish edges smooth.
      1. Edge Condition: Square cut.
      2. Corner Condition in Elevation: Square.
   c. Mounting: Surface mounted to wall with two-face tape.

C. ACCESSORIES
1. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
2. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

D. FABRICATION
1. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
2. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.
3. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.
4. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
   a. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Subsequent changeable inserts are by Owner.

E. GENERAL FINISH REQUIREMENTS
1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
3. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
4. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

11000 EQUIPMENT - NOT USED.

12000 FURNISHINGS
12.1 FOOTGRILLES: MATS INC ULTRA TRACK. SIZE INDICATED ON DRAWINGS.

13000 SPECIAL CONSTRUCTION - NOT USED.

14000 CONVEYANCE - NOT USED.

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	1 1/2" = 1'-0"
DESN. BY:	RDP
DRAWN BY:	BAH
CHKD BY:	RDP
ISSUE DATE:	10/20/2021

STAMP

REVISIONS

SHEET TITLE:
OUTLINE SPECIFICATIONS

A0.3

OUTLINE SPECIFICATIONS A0.3

1/8" = 1'-0" 32' 16' 8' 4' 0' 4
3/32" = 1'-0" 64' 32' 16' 8' 0' 3
1/16" = 1'-0" 64' 32' 16' 8' 0' 2 1

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A B C D E F

Sanborton Town Hall
Building Code Review

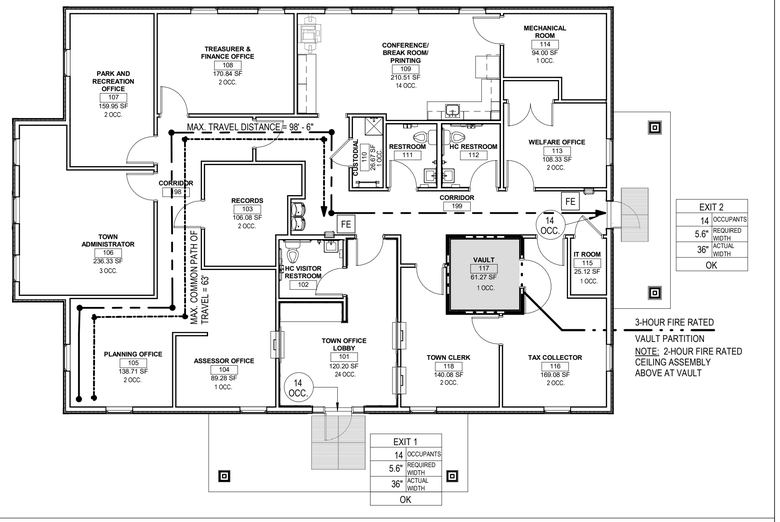
	Building Area		Occupancy	
Floor Area	**First Floor**		**First Floor**	
Business	2,747		28	
TOTAL SQUARE FEET	**2,747**		**TOTAL OCCUPANTS**	**28**

FIRE SUPPRESSION SYSTEM NOT PROVIDED

2015 International Building Code	**CODE**		REFERENCE
	Required/Allowed	**Proposed**	
Building Construction Type	VB	**VB**	602, Table 601
Use Group		**Business**	304.1
Occupancy			Table 1004.1.2
Use B (Office)	2,747 SF @ 1/100 Gross	**28 occ**	
Allowed Height:			
Allowable Height	2 Story, 40 Feet	**1 Story, 34.5 Feet**	Table 504.3,Table 504.4
Allowed Area (sf/floor):	9,000 SF	2,736 SF	Table 506.2
Frontage Increase:	*(.75%) = 6,750*		
	Total Allowable = 15,750 SF	**2,746 SF**	
Fire Resistance Requirements for Building Elements			Table 601
Structural Frame	0 hr	**0 hr**	Table 601
Bearing Walls			
Exterior	0 hr	**0 hr**	Table 602
Interior	0 hr	**0 hr**	Table 601
Non Load Bearing Walls			
Exterior	0 hr, >10 - <30 ft Separation Distance	**N/A**	
Interior	0 hr	**0 hr**	
Floor Construction			Table 601
Incl. supporting beams and joists	0 hr	**0 hr**	
Roof Construction			Table 601
Incl. supporting beams and joists	0 hr	**0 hr**	
Roof Supports for Roof only:			
Fire resistive ratings of structural frame and bearing walls are permitted to be reduced by one hour when supporting roof only.	0 hr	**0 hr**	Table 601
> 20' height Use F-1, H,M,and S-1	0 hr	**0 hr**	Table 601 note c
Draft Stopping in Attics	Not Required	**N/A**	718.4
Insulation			
In concealed spaces/Attics	Flame spread <25, Smoke Development <450	**Provided**	720.2
Interior Finishes			
Without Sprinkler:			
Req'd. Vert. Exits & Passageways	B or better	**N/A**	Table 803.11 Ex. b
Corridors Providing Exit Access	B or better	**Provided**	Table 803.11
Rooms or Enclosed Spaces	C or better	**Provided**	Table 803.11
Floor Finish @ vert. exits,	Class 2 \ Pill Test	**Provided**	804.4.1
Fire Protection Systems			
Automatic Fire Suppression System	Not Required	**Not Provided**	903.2
Standpipe System	Not Required	**Not Provided**	905.3.1
Fire Extinguishers	Required	**Provided**	906.1
Fire Alarm System:			907.2.2
Manual Fire Alarm System	Not Required	**N/A**	
Occupant Notification System	Not Required	**Provided**	
Smoke Alarms	Not Required	**Provided**	
Mechanical Systems may require smoke detection system.		**N/A**	
Means of Egress			1003
Doors			1010.1.1.1
Min. Width	32" Min. clear width	**>32"**	
Max Width	48" Max. clear width	**<48"**	
Min Height	80" Min. height	**>80"**	
Panic Hardware	Not Required	**Not Provided**	1010.1.10
Exit Access			
Minimum Number of Exits	2	**2 Provided**	1006.3.2
Maximum Occupant Load	49	**Comply**	Table 1006.2.1
Exit Separation (w/o spklr)	1/2 diagonal distance	**>1/2**	1007.1.1
Exit Access Travel Distance without sprinkler	200'	**<200'**	Table 1017.2
Common Path of Travel without sprinkler	75'	**<75'**	Table 1006.2.1
Corridor Width			
<100 Occupants	44" Min.	**>44"**	Table 1020.2
Corridor Rating			1020.1 ex 4
without sprinkler	1 hr.(when occupancy >30)	**N/A**	Table 1020.1
Dead End Corridors			1020.4
E without sprinkler	20' Max.	**<20'**	
Exit Discharge			
General	Required	**Provided**	1028.1
Capacity of Means of Egress			1005.3.2
Doors (First Floor)	0.2"p.p. = 28 x .2 = 5.6" Required	**36" Provided**	
Accessibility Requirements			
Accessible Entrance	Required 60%	**Provided**	1105.1
Warnings and Signage	Required	**Provided**	1111.1
Accessible Toilet Rooms	Required	**Provided**	1109.2
Accessible Family Toilet Rooms	Not Required	**N/A**	1109.2.1
Accessible Kitchens	Required	**Provided**	1109.4
Accesible Drinking Fountains	Required	**2**	1109.5
Plumbing Fixtures			IPC Table 2902.1
Business		**28 Occupants Total**	Table 2902.1
Water Closets	1 per 25	**3**	
Lavatories	1 per 40	**3**	
Drinking Fountains	1 per 100	**2**	
Service Sinks	1 sink required	**1**	
Energy Efficiency			
Climate Zone	Belknap County- Zone 6A		IECC Table 301.1
Insulation and fenestration requirements by component			
	Max U-factor	R value	
Fenestration(Operable)	0.43		**0.43 Provided** IECC Table C 402.4
Fenestration(Entry Doors)	0.77		**0.77 Provided** IECC Table C 402.4
Roof(Attic)		R49	**R60 Provided** IECC Table C 402.1.3
Wood Framed Walls		R13 + 7.5 ci	**R23 + R10 ci Provided** IECC Table C 402.1.3
Basement wall		R7.5	**N/A** IECC Table C 402.1.3
Unheated Slab		R10,24"	**R10, 48"** IECC Table C 402.1.3
			R10, underslab Provided

2015 NFPA 101	**CODE**		REFERENCE
LIFE SAFETY CODE	**Required**	**Proposed**	
Occupancy	New Business	**New Business**	Chapter 38
Type Construction	Type V (000)	**Type V (000)**	Table A8.2.1.2,
Occupancy			
Use B (Office)	2,747 SF @ 1/100 Gross	**28 occ**	Table 7.3.1.2
Means of Egress Components			
Doors	Min 70" x 32"	**Provided**	7.2.1.2.3.2
Panic Hardware	Not Required	**Provided**	38.2.2.2.3
Means of Egress Width & Height			
Minimum Door Width	32"	**> 32" (36" leaf)**	7.2.1.2.3
Min. Door Height	80"	**>= 80"**	7.2.1.2.2
Min. Corridor Height	7'-6"	**>7'-6"**	7.1.5
Capacity of Means of Egress			
Doors (First Floor)	0.2"pp = 28 x .2 = 5.6" Required	**36" Provided**	Table 7.3.3.1
Exit Access Travel Distance without sprinkler	200'	**<200'**	38.2.6.2
Common Path of Travel without sprinkler	100'(occ<30)	**<100'**	38.2.5.3.2
Dead End Corridors E without sprinkler	20' Max.	**<20'**	38.2.5.2
Number of Exits			
Min. Number of Exits	2 Required	**2 exits provided**	38.2.4.1, 7.4.1.2
Interior Finishes			
Exit enclosures	A or B	**Provided**	38.3.3.2
Lobbies and corridors	A or B	**Provided**	38.3.3.2
Rooms and enclosed spaces	A, B or C	**Provided**	38.3.3.2
Floor Finish	Class I or II in exit closure	**N/A**	38.3.3.3
Detection, Alarm & Notification			
Fire Alarm/Auto Detection System	Required >300 occ	**N/A**	38.3.4.1.1
Initiation by all of the following:			
Manual	Required	**Provided**	
	Any detection devices	**Provided**	
Occupant Notification	Required	**Provided**	
Visual	Required for hearing impaired	**Provided**	
Audible	Required	**Provided**	
Fire Department Notification	Required, per 9.6.4	**Provided**	
Alarm Annunciation	Required with Alarm	**Provided**	
Smoke Detection Devices	Not Required	**N/A**	9.6.2.10
Extinguishing Requirements			
Automatic Sprinkler	Not Required	**Not Provided**	38.3.5
Portable Fire Extinguishers	Required	**Provided**	
Fire Resistance Requirements Construction Type V (000) reference to IBC 5B			Table A8.2.1.2
		Type V (000) Assembly Required	Table 4.1.1 (NFPA 220)
Exterior Bearing Walls			
Supporting more than one floor	**0 hr**	**0 hr**	
Supporting one floor	**0 hr**	**0 hr**	
Supporting roof	**0 hr**	**0 hr**	
Interior Bearing Walls			
Supporting more than one floor	**0 hr**	**0 hr**	
Supporting one floor	**0 hr**	**0 hr**	
Supporting roof	**0 hr**	**0 hr**	
Columns			
Supporting more than one floor	**0 hr**	**0 hr**	
Supporting one floor	**0 hr**	**0 hr**	
Supporting roof	**0 hr**	**0 hr**	
Beams, Girders, Trusses			
Supporting more than one floor	**0 hr**	**0 hr**	
Supporting one floor	**0 hr**	**0 hr**	
Supporting roof	**0 hr**	**0 hr**	
Floor Construction	**0 hr**	**0 hr**	
Roof	**0 hr**	**0 hr**	
Exterior Nonbearing walls	**0 hr**	**0 hr**	

Note:
All Fire Partitions, Fire Barriers, and Smoke Partitions shall extend to the underside of deck of floor above, typical for all Code Reviews.



1 A0.4 FIRST FLOOR EGRESS PLAN
Scale: 1/8" = 1'-0"

LEGEND

Room name / 101 / 150 SF / 20 OCC.	ROOM NAME / ROOM NUMBER / AREA / # OCCUPANTS
146 OCC.	EGRESS TRAVEL PATH
EXIT 1 / 22 OCCUPANTS / 5" / 36" REQUIRED WIDTH / ACTUAL WIDTH / 42" / OK	EGRESS NUMBER / CAPACITY / REQUIRED OPENING WIDTH / ACTUAL OPENING WIDTH
	3 HR. FIRE RATED ASSEMBLY w/90 MIN. OPENINGS
FE	FIRE EXTINGUISHER LOCATION
	MAXIMUM PATH OF TRAVEL
	MAXIMUM DEAD END CORRIDOR
	MAXIMUM COMMON PATH OF TRAVEL

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TOWN OF SANBORNTON NEW HAMPSHIRE GRANTED 1748 INCORPORATED 1770

CODE REVIEW & EGRESS PLAN
A0.4

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP
SCALE:	As indicated	
DESN. BY:	RDP	
DRAWN BY:	EJD/SZ/BAH	
CHKD BY:	RDP	
ISSUE DATE:	10/20/2021	

REVISIONS

SHEET TITLE:
CODE REVIEW & EGRESS PLAN

A0.4

1/8" = 1'-0" (32' / 16' / 8' / 4' / 0')
3/32" = 1'-0" (64' / 32' / 16' / 8' / 0')
1/16" = 1'-0" (64' / 32' / 16' / 8' / 0')

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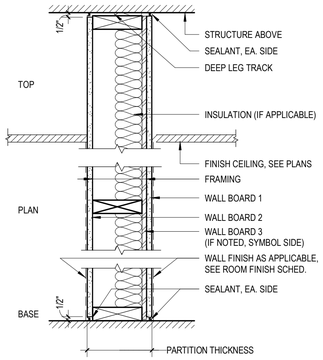
A B C D E F

PARTITION TYPE A



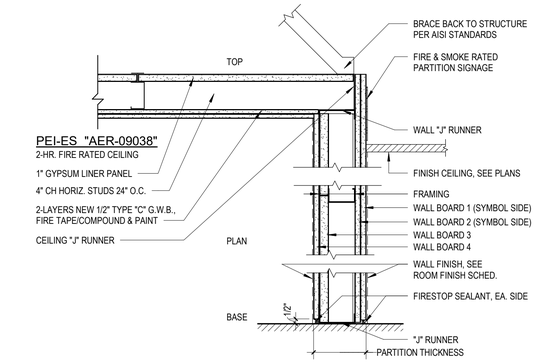
T.O.W. CONDITION B

PARTITION NOTES:

1. PROVIDE MOISTURE RESISTANT GWB ON ALL WALLS & CEILINGS IN ALL BATHROOM & RESTROOM LOCATIONS, & WITHIN 4'-0" OF SINKS, TOILETS AND SHOWERS. PROVIDE CEMENT BACKER BOARD OF SIMILAR THICKNESS TO 8'-0" A.F.F. AT ALL SHOWER STALLS IN PLACE OF GWB.
2. REFER TO 2015 UL FIRE RESISTANCE DIRECTORY FOR ADDITIONAL INFORMATION REGARDING CONSTRUCTION REQUIREMENTS OF UL RATED FIRE ASSEMBLIES LISTED BELOW.

TYPE MARK	PARTITION THICKNESS	UL RATING	STC RATING	INSULATION TYPE	FRAMING	SPACING	WALL BOARD 1	WALL BOARD 2	WALL BOARD 3	WALL BOARD 4	SEALANT TYPE	T.O.W. CONDITION
A1	4 3/4"	N/A	N/A	3" SAFB	2 x 4 WD STUDS	1'-4" O.C.	5/8" GWB	5/8" GWB	-	-	ACOUST.	B
A2	6 3/4"	N/A	N/A	3" SAFB	2 x 6 WD STUDS	1'-4" O.C.	5/8" GWB	5/8" GWB	-	-	ACOUST.	B
A6	5 1/4"	N/A	N/A	3" SAFB	2 x 4 WD STUDS	1'-4" O.C.	5/8" GWB	5/8" GWB	LEVEL III BR PANEL	-	ACOUST.	B

PARTITION TYPE F



T.O.W. CONDITION B

TYPE MARK	PARTITION THICKNESS	UL RATING	STC RATING	INSULATION TYPE	FRAMING	SPACING	WALL BOARD 1	WALL BOARD 2	WALL BOARD 3	WALL BOARD 4	SEALANT TYPE	T.O.W. CONDITION
F1	5 7/8"	U415 (3 HR)	N/A	-	4" 25 Ga. "CH" STUDS	2'-0" O.C.	5/8" TYPE "X" GWB	5/8" TYPE "X" GWB	1" GYP. LINER PANEL	5/8" TYPE "X" GWB	FIRE	B

GENERAL PARTITION NOTES

1. PROVIDE MOISTURE RESISTANT GWB ON ALL WALLS & CEILINGS IN ALL BATHROOM, RESTROOM & SHOWER LOCATIONS, & WITHIN 4'-0" OF SINKS, TOILETS AND SHOWERS.
2. INSTALL ALL FIRE RATED WALL & CEILING ASSEMBLIES FOLLOWING DETAILS. FASTENERS AND SPACING IN ACCORDANCE WITH UL/GA FIRE RESISTANCE DIRECTORY(IES).
3. EXTEND GWB TO UNDERSIDE OF FLOOR OR DECK ON FIRE BARRIERS. GWB SHALL TERMINATE AT UNDERSIDE OF DECK AT FIRE PARTITIONS UNLESS OTHERWISE DETAILED.
4. STAGGER ALL ELECTRICAL DEVICES IN FIRE BARRIERS & FIRE PARTITIONS.
5. INSTALL APPROVED FIRE STOP MATERIAL AT ALL PENETRATIONS THROUGH FIRE RATED WALLS & FLOORS.
6. ALL WIRE PENETRATIONS THROUGH FIRE RATED WALLS PLATES & FLOORS SHALL BE SEALED WITH FIRE STOP SEALANT.
7. METALLIC PIPE PENETRATIONS SHALL BE SEALED AROUND PENETRATIONS WITH FIRE STOP SEALANT AT FIRE RATED WALLS, FLOORS & CEILINGS.
8. NON-METALLIC PIPE PENETRATIONS SHALL BE SEALED WITH FIRE STOP COLLAR AROUND PENETRATION WITH FIRE STOP SEALANT.
9. CM SHALL REVIEW PRIOR TO INSTALLATION ANY CONFLICT OF ENGINEERING TRADE DEVICES (I.E. FIRE ALARM STROBES) WITH ARCHITECTURAL DETAILS AND BRING THOSE DISCREPANCIES TO THE ARCHITECT FOR REVIEW.

PARTITION SIGNAGE

3 HOUR RATED
FIRE/SMOKE WALL
PROTECT ALL OPENINGS
AND PENETRATIONS

3" HIGH "RED" LETTERING
w/MIN. 3/8" STROKE ON "WHITE" BACKGROUND;
FIRE & SMOKE RATED PARTITION SIGNAGE
TO BE LOCATED ON WALL SURFACES,
ABOVE CEILINGS, OVER ALL WALL OPENINGS
BUT NOT LESS THAN 15 FEET FROM WALL ENDS
& SPACED 30 FEET O.C. MAX.

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REVISIONS

SHEET TITLE:

PARTITION TYPES

A0.5

PARTITION TYPES

A0.5

1/8" = 1'-0" 32' 16' 8' 4' 0' 64' 32' 16' 8' 0'
3/32" = 1'-0" 64' 32' 16' 8' 0'
1/16" = 1'-0" 32' 16' 8' 0'

4 3 2 1

A B C D E F

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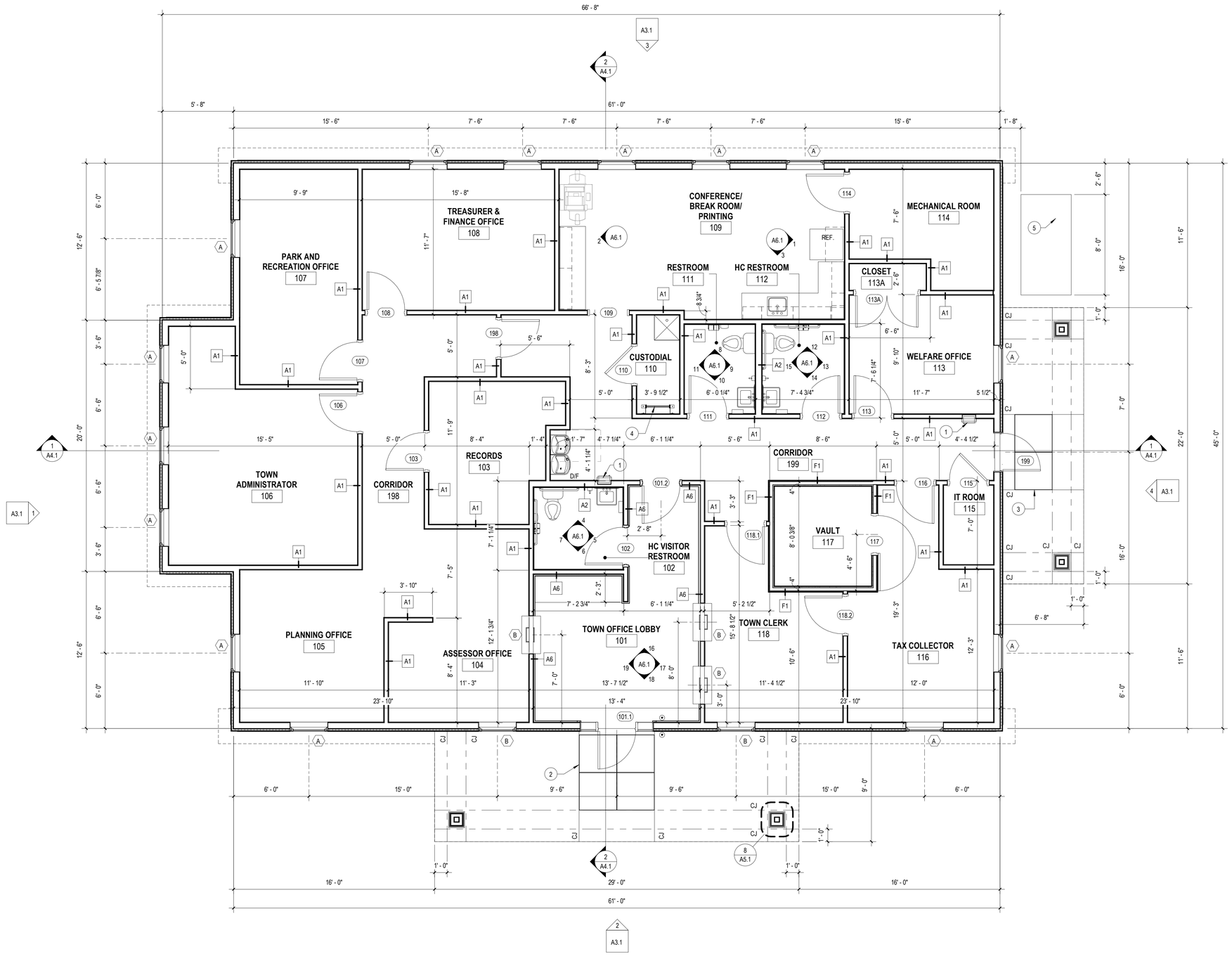

1 A1.1 FIRST FLOOR PLAN

Scale: 1/4" = 1'-0"

GENERAL FLOOR PLAN NOTES

1. FINISH FLOOR ELEVATION = XXX'-X". -(X) = DISTANCE OF GRADE BELOW FFE IN INCHES. + X = DISTANCE OF GRADE ABOVE FFE IN INCHES. FINISH FLOOR ELEVATION OF BUILDING IS REFERENCED AS ARCHITECTURAL DATUM ELEVATION 100'-0", AND IS MEASURED FROM THE TOP OF CONCRETE SLAB. SEE CIVIL DRAWINGS FOR ELEVATIONS BASED ON TOPOGRAPHIC DATUM.
2. DO NOT SCALE DRAWINGS
3. THE CONTRACTOR SHALL PROVIDE BLOCKING FOR ALL MILLWORK, MECHANICAL FIXTURES, PLUMBING FIXTURES AND ELECTRICAL DEVICES AS REQUIRED.
4. ALL LUMBER IN DIRECT CONTACT WITH CONCRETE SHALL BE PRESSURE TREATED INCLUDING ALL SILL PLATES FOR WOOD STUD WALLS.
5. CM SHALL REVIEW PRIOR TO INSTALLATION ANY CONFLICT OF ENGINEERING TRADE DEVICES (I.E. FIRE ALARM STROBES) WITH ARCHITECTURAL DETAILS AND BRING THOSE DISCREPANCIES TO THE ARCHITECT FOR REVIEW.
6. ALL DIMENSIONS ARE TO FACE OF STUD, FACE OF CONCRETE, FACE OF MASONRY OR CENTER OF OPENING, U.N.O.
7. COORDINATE MISCELLANEOUS STEEL REQUIREMENTS FOR MOUNTING / HANGING OWNER SUPPLIED EQUIPMENT.
8. BUILDER SHALL COORDINATE ALL ROUGH OPENING DIMENSIONS WITH FLASHING DETAILS.

GENERAL PARTITION NOTES

1. SEE SHEET A0.4 FOR PARTITION TYPES. PROVIDE MOISTURE RESISTANT GWB ON ALL WALLS & CEILINGS IN ALL BATHROOM, RESTROOM & SHOWER LOCATIONS, & WITHIN 4'-0" OF SINKS, TOILETS AND SHOWERS.
2. INSTALL ALL FIRE RATED WALL & CEILING ASSEMBLIES FOLLOWING DETAILS. FASTENERS AND SPACING IN ACCORDANCE WITH UL/GA FIRE RESISTANCE DIRECTORY(IIES).
3. EXTEND GWB TO UNDERSIDE OF FLOOR OR DECK ON FIRE BARRIERS. GWB SHALL TERMINATE AT UNDERSIDE OF DECK AT FIRE PARTITIONS UNLESS OTHERWISE DETAILED.
4. STAGGER ALL ELECTRICAL DEVICES IN FIRE BARRIERS & FIRE PARTITIONS.
5. INSTALL APPROVED FIRE STOP MATERIAL AT ALL PENETRATIONS THROUGH FIRE RATED WALLS & FLOORS.
6. ALL WIRE PENETRATIONS THROUGH FIRE RATED WALLS PLATES & FLOORS SHALL BE SEALED WITH FIRE STOP SEALANT.
7. METALLIC PIPE PENETRATIONS SHALL BE SEALED AROUND PENETRATIONS WITH FIRE STOP SEALANT AT FIRE RATED WALLS, FLOORS & CEILINGS.
8. NON-METALLIC PIPE PENETRATIONS SHALL BE SEALED WITH FIRE STOP COLLAR AROUND PENETRATION WITH FIRE STOP SEALANT.
9. CM SHALL REVIEW PRIOR TO INSTALLATION ANY CONFLICT OF ENGINEERING TRADE DEVICES (I.E. FIRE ALARM STROBES) WITH ARCHITECTURAL DETAILS AND BRING THOSE DISCREPANCIES TO THE ARCHITECT FOR REVIEW.

CONSTRUCTION LEGEND

- NEW CONSTRUCTION
- EXISTING CONSTRUCTION
- (X) CONSTRUCTION NOTE. SEE LEGEND BELOW

CONSTRUCTION NOTE LEGEND

1. 10 LBS ABC FIRE EXTINGUISHER IN SEMI-RECESSED CABINET
2. (4) 3' - 0" x 3' - 0" FOOT GRILLES
3. (2) 3' - 0" x 3' - 0" FOOT GRILLES
4. PTD. STL. ATTIC ACCESS LADDER
5. CONC. CONDENSER PAD
6. ADA AUTOMATIC DOOR OPENER

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91 Bisson Avenue
Laconia, NH 03246
Phone 603-524-3411
Fax 603-524-4641

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	1/4" = 1'-0"
DESN. BY:	RDP
DRAWN BY:	EJD
CHKD BY:	RDP
ISSUE DATE:	10/20/21

STAMP

REVISIONS

SHEET TITLE:

FIRST FLOOR PLAN

A1.1

FIRST FLOOR PLAN
A1.1

1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

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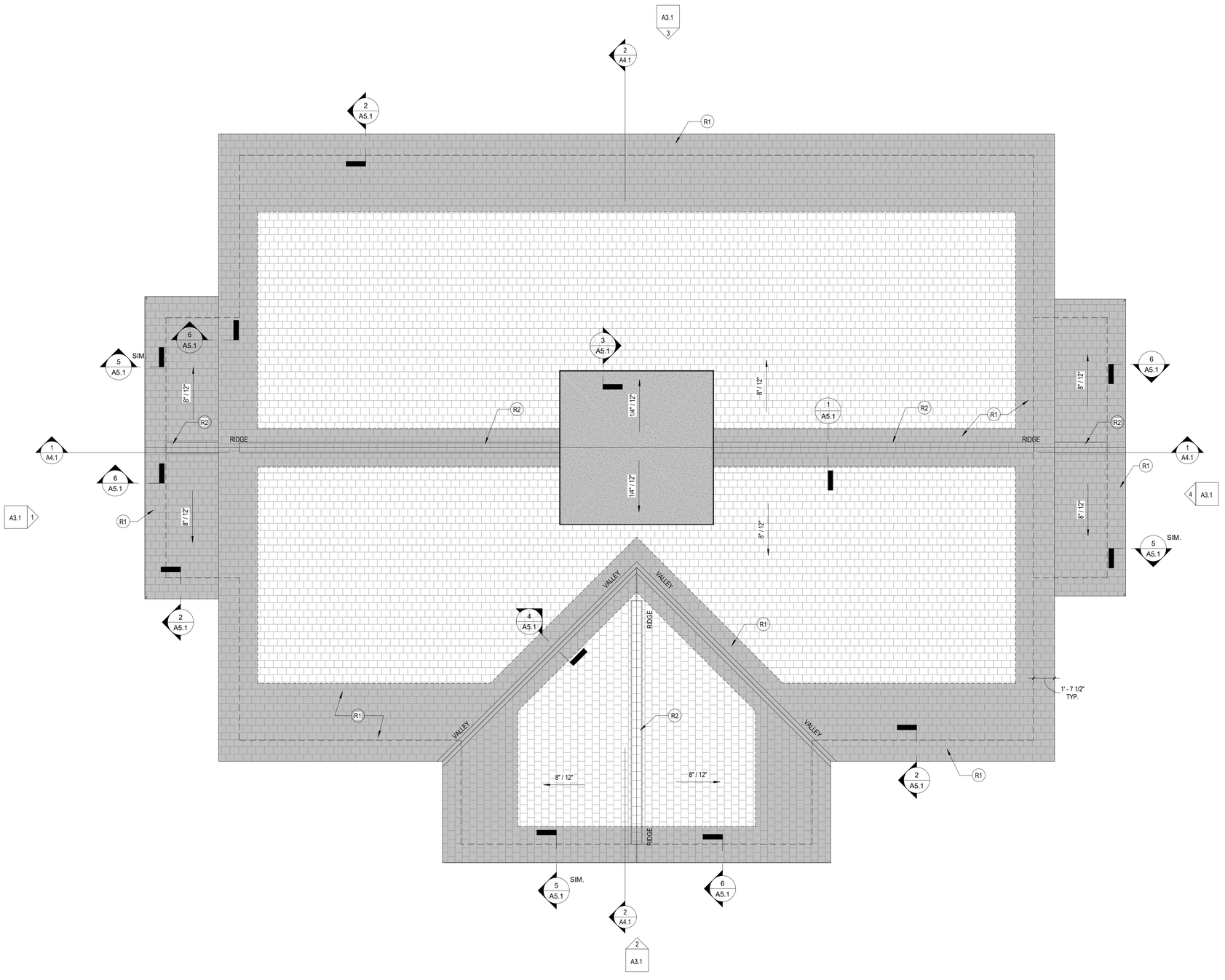

1 A1.2 ROOF PLAN

Scale: 1/4" = 1'-0"

N

GENERAL ROOF PLAN NOTES

1. VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD AND NOTIFY ARCHITECT OF ANY DISCREPANCIES BEFORE PROCEEDING WITH CONSTRUCTION.
2. ROOF INSULATION SHALL BE R-25 MINIMUM.

ROOF PLAN LEGEND

- ASPHALT SHINGLES
- MEMBRANE ROOFING
- DS - DOWNSPOUT
- VTR - ROOF VENT
- X - CONSTRUCTION NOTE. SEE LEGEND BELOW

ROOF CONSTRUCTION NOTES

- R1 MEMBRANE UNDERLAYMENT: (2) COURSES AT EAVES & VALLEYS, (1) COURSE AT RIDGES AND RAKES
- R2 RIDGE VENT
- R3 MEMBRANE UNDERLAYMENT UNDER MEMBRANE ROOFING COVER BOARD

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

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REVISIONS

SHEET TITLE:

ROOF PLAN

A1.2

ROOF PLAN A1.2

1/8" = 1'-0" 3/32" = 1'-0" 1/16" = 1'-0"

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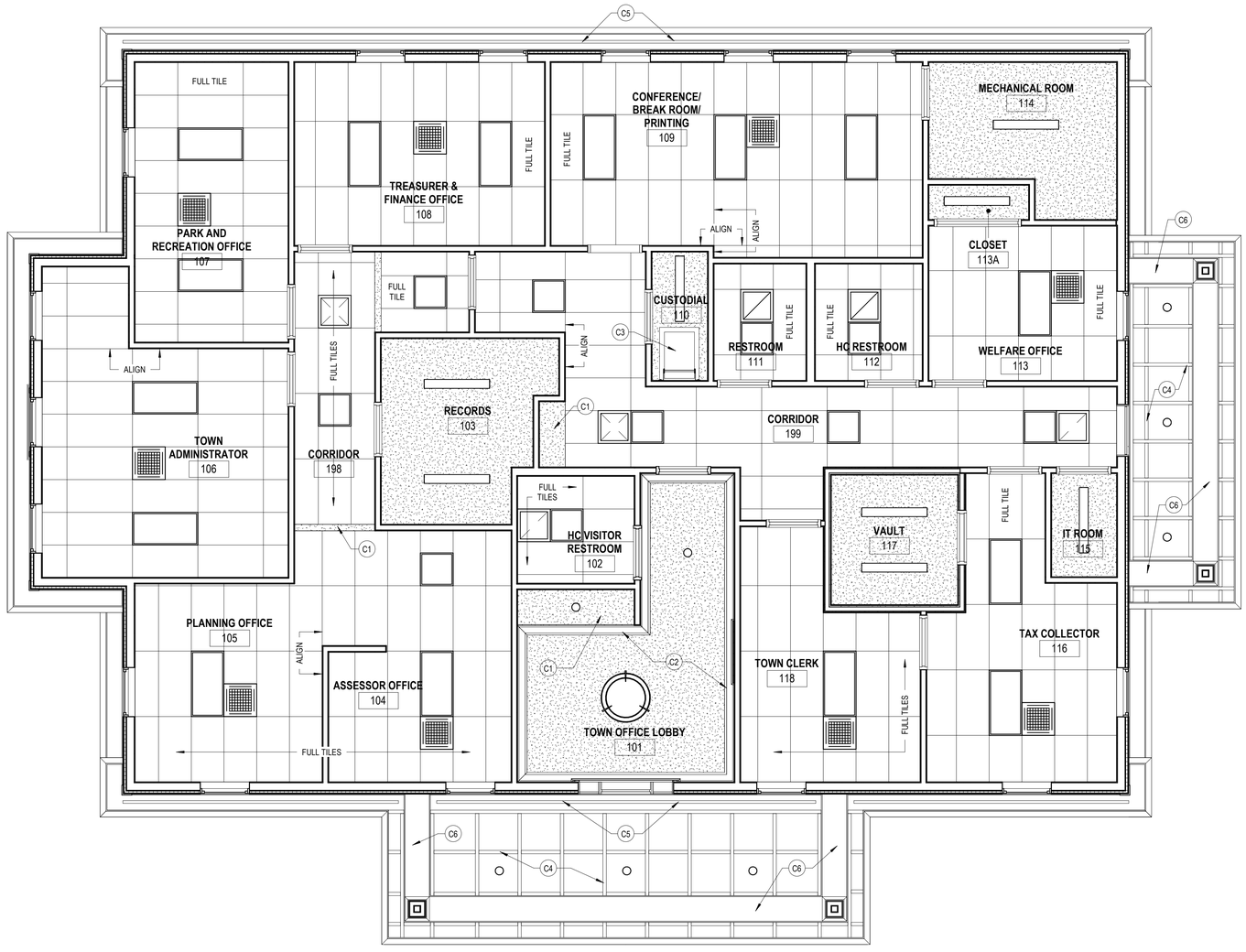

RCP GENERAL NOTES

1. SEE SHEET ROOM FINISH SCHEDULE FOR CEILING TYPE LOCATIONS AND CEILING HEIGHTS.
2. SEE WINDOW HEAD DETAILS FOR CEILING CONDITIONS AT WINDOWS.
3. PROVIDE 5/8" GWB & VAPOR BARRIER ON WD FURRING ON TRUSS CHORDS ABOVE ALL FIRST FLOOR CEILINGS.

CEILING LEGEND

CEILINGS

- 4' x 2' SUSP. ACOUSTICAL PANEL CEILING
- GWB SOFFIT

ELECTRICAL

- 2' x 4' RECESSED LIGHTING FIXTURE
- 2' x 2' RECESSED LIGHTING FIXTURE
- PENDANT LIGHTING FIXTURE, SEE ELEC. DWG'S.
- 1' x 4' SURFACE MOUNTED LIGHTING FIXTURE
- RECESSED DOWNLIGHT
- LED WALL PACK

MECHANICAL

- HVAC SUPPLY DIFFUSER ; SEE MECH.
- HVAC RETURN GRILL; SEE MECH.
- HVAC EXHAUST GRILL; SEE MECH.
- RECESSED CEILING CASSETTE; SEE MECH.
- RECESSED CEILING UNIT HEATER; SEE MECH.
- UNIT HEATER; SEE MECH.

GENERAL

- (X) CONSTRUCTION NOTE. SEE LEGEND BELOW

CONSTRUCTION NOTE LEGEND

- (C1) GWB SOFFIT @ 8'-0" A.F.F.
- (C2) WOOD CROWN MOLDING
- (C3) ATTIC ACCESS PANEL
- (C4) 1x3 CEDAR BATTENS ON 1/2" PLYWOOD PANEL CEILING, PTD.
- (C5) CONT. METAL SOFFIT VENT
- (C6) BUILT-UP WD. BEAM ENCLOSURE

1 / A1.3 FIRST FLOOR REFLECTED CEILING PLAN
Scale: 1/4" = 1'-0"

N

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SHEET TITLE:
FIRST FLOOR REFLECTED CEILING PLAN

A1.3

FIRST FLOOR REFLECTED CEILING PLAN A1.3

1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

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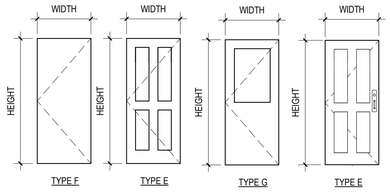
ROOM FINISH SCHEDULE

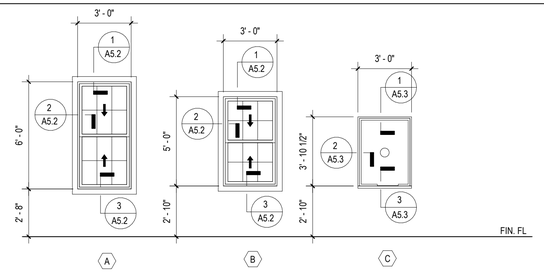
ROOM NUMBER	ROOM NAME	AREA	FLOOR		BASE	CASEWORK			NORTH WALL		EAST WALL		SOUTH WALL		WEST WALL		CEILING			COMMENTS
			SUBSTRATE	FINISH	FINISH	CABINETS	COUNTERS	SILLS	SUBSTRATE	FINISH	SUBSTRATE	FINISH	SUBSTRATE	FINISH	SUBSTRATE	FINISH	SUBSTRATE	HEIGHT	FINISH	
FIRST FLOOR																				
101	TOWN OFFICE LOBBY	193.06 SF	CONC	WOM-1	RB-1	-	SS-1	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	PT-5	
102	HC VISITOR RESTROOM	46.04 SF	CONC	SF-1	SF-1	-	-	-	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	9' - 0"	ACT-1	
103	RECORDS	106.08 SF	CONC	CPT-1	RB-1	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	12' - 0"	PT-5	
104	ASSESSOR OFFICE	89.28 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
105	PLANNING OFFICE	138.71 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
106	TOWN ADMINISTRATOR	236.33 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
107	PARK AND RECREATION OFFICE	159.95 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
108	TREASURER & FINANCE OFFICE	170.84 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
109	CONFERENCE/ BREAK ROOM/ PRINTING	210.51 SF	CONC	RF-1	RB-1	PL-1	SS-1	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
110	CUSTODIAL	26.67 SF	CONC	SF-1	SF-1	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	12' - 0"	PT-5	
111	RESTROOM	39.55 SF	CONC	SF-1	SF-1	-	-	-	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	9' - 0"	ACT-1	
112	HC RESTROOM	46.04 SF	CONC	SF-1	SF-1	-	-	-	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	PT-1,CT-1	GWB	9' - 0"	ACT-1	
113	WELFARE OFFICE	108.33 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
113A	CLOSET	12.84 SF	CONC	CPT-1	-	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
114	MECHANICAL ROOM	94.00 SF	CONC	SEALED	RB-1	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	12' - 0"	PT-5	
115	IT ROOM	25.12 SF	CONC	SEALED	RB-1	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	12' - 0"	PT-5	
116	TAX COLLECTOR	169.08 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
117	VAULT	61.27 SF	CONC	RF-1	RB-1	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 4"	PT-5	
118	TOWN CLERK	140.08 SF	CONC	CPT-1	RB-1	-	-	SS-2	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
198	CORRIDOR	200.00 SF	CONC	CPT-1	RB-1	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	
199	CORRIDOR	254.99 SF	CONC	WOM-1	RB-1	-	-	-	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	PT-1	GWB	9' - 0"	ACT-1	

DOOR AND FRAME SCHEDULE

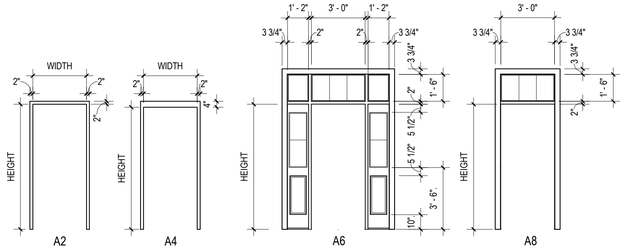
DOOR #	ROOM NAME	ROOM #	DOOR							FRAME			ASSEMBLY RATING	DETAIL LOCATION			FUNCTION	HARDWARE SET	SIGNAGE		DOOR NOTES
			DOOR TYPE	WIDTH	HEIGHT	THICKNESS	GLAZING TYPE	MATERIAL	FINISH	FRAME TYPE	MATERIAL	FINISH		HEAD	JAMB	SILL			TYPE	TEXT	
FIRST FLOOR																					
101.1	TOWN OFFICE LOBBY	101	E	3' - 0"	7' - 0"	1 3/4"	IG-1	FG	PT-4	A6	WD	FF ALUM	-	4/A5.4	5/A5.4	6/A5.4	EXIT	SET 1	M	EXIT	
101.2	TOWN OFFICE LOBBY	101	E	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	EXIT	SET 4	M	EXIT	
102	HC VISITOR RESTROOM	102	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	PRIVACY	SET 6	J		
103	RECORDS	103	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 3	D	ROOM NAME	
106	TOWN ADMINISTRATOR	106	G	3' - 0"	7' - 0"	1 3/4"	G-1	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 5	A		
107	PARK AND RECREATION OFFICE	107	G	3' - 0"	7' - 0"	1 3/4"	G-1	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 5	A		
108	TREASURER & FINANCE OFFICE	108	G	3' - 0"	7' - 0"	1 3/4"	G-1	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 5	A		
109	CONFERENCE/ BREAK ROOM/ PRINTING	109	N/A	3' - 0"	7' - 0"	N/A	-	-	-	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	-	-	D	ROOM NAME	
110	CUSTODIAL	110	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	STORAGE	SET 3	D	ROOM NAME	
111	RESTROOM	111	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	PRIVACY	SET 6	J		
112	HC RESTROOM	112	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	PRIVACY	SET 6	J		
113	WELFARE OFFICE	113	G	3' - 0"	7' - 0"	1 3/4"	G-1	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 6	A		
113A	CLOSET	113A	F(PAIR)	5' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	-	SET 7	D	ROOM NAME	
114	MECHANICAL ROOM	114	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	STORAGE	SET 3	D	ROOM NAME	
115	IT ROOM	115	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	STORAGE	SET 3	D	ROOM NAME	
116	TAX COLLECTOR	116	G	3' - 0"	7' - 0"	1 3/4"	G-1	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 5	A		
117	VAULT	117	F	3' - 0"	7' - 0"	1 3/4"	-	HM	PT-2	A2	HM	PT-2	90 MIN.	7/A5.4	8/A5.4	6/A5.4	STORAGE	SET 3	D	ROOM NAME	
118.1	TOWN CLERK	118	G	3' - 0"	7' - 0"	1 3/4"	G-1	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 5	A		
118.2	TOWN CLERK	118	G	3' - 0"	7' - 0"	1 3/4"	G-1	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 5	A		
198	CORRIDOR	198	F	3' - 0"	7' - 0"	1 3/4"	-	WD	FF	A2	HM	PT-2	-	7/A5.4	8/A5.4	-	OFFICE	SET 4	D	ROOM NAME	
199	CORRIDOR	199	E	3' - 0"	7' - 0"	1 3/8"	IG-1	FG	PT-4	A8	WD	FF ALUM	-	4/A5.4	5/A5.4	6/A5.4	EXIT	SET 2	M	EXIT	



DOOR TYPES
Scale: 1/4" = 1'-0"



WINDOW TYPES
Scale: 1/4" = 1'-0"



FRAME TYPES
Scale: 1/4" = 1'-0"

HARDWARE SETS

HARDWARE SET 1

3 HINGES
1 LEVER LOCKSET
1 ELECTRIC STRIKE
1 AUTOMATIC DOOR OPENER
1 PROXIMITY READER
1 DEADBOLT
1 CLOSER
1 THRESHOLD
1 KICKPLATE
1 SET WEATHERSTRIPPING

HARDWARE SET 2

3 HINGES
1 LEVER LOCKSET
1 DEADBOLT
1 CLOSER
1 THRESHOLD
1 KICKPLATE
1 SET WEATHERSTRIPPING

HARDWARE SET 3

3 HINGES
1 LEVER LOCKSET - STORAGE FUNCTION
1 SMOKE SEAL
1 KICKPLATE

HARDWARE SET 4

3 HINGES
1 LEVER LOCKSET - OFFICE FUNCTION
1 CLOSER
1 MECHANICAL HOLD OPEN DEVICE
1 KICKPLATE
3 SILENCERS

HARDWARE SET 5

3 HINGES
1 LEVER LOCKSET - OFFICE FUNCTION
1 KICKPLATE
3 SILENCERS

HARDWARE SET 6

3 HINGES
1 LEVER LOCKSET w/PRIVACY INDICATOR
1 KICKPLATE
3 SILENCERS

HARDWARE SET 7

6 HINGES
1 LEVER LOCKSET - STORAGE FUNCTION
1 TOP & BOTTOM FLUSH BOLT

GENERAL FINISH NOTES

1. SEE INTERIOR MATERIALS LEGEND FOR FINISH SCHEDULE DESIGNATIONS.
2. ALL ELECTRICAL FIXTURE PLATES AND COVERS SHALL BE IVORY, U.N.O.
3. SEE DOOR SCHEDULE FOR DOOR & FRAME PAINT COLORS.
4. SEE INTERIOR ELEVATIONS ON "A6" SERIES SHEETS.
5. ALL SHEET VINYL SHALL HAVE WELDED SEAMS.

FINISH SCHEDULE LEGEND

-

FINISH SCHEDULE COMMENTS

NOTE 1: WAINSCOT @ 4'-4". PROVIDE SCHLUTER SCHIENE BRUSH ALUM. FINISH STRIP AT ALL EXPOSED EDGES OF TILE.

NOTE 2: CONTINUOUS ACCENT TILE AT TILE COURSE #6.

NOTE 3: ACCENT WALL LOCATION

NOTE 4: FINISHES BY MANU.

NOTE 5: INSTALL WOM-1 ON GROUND FLOOR ENTRY ONLY, REMAINDER OF LANDINGS TO BE RFT-1.

NOTE 6: REFER TO DETAIL ON A7.1 FOR TILE LOCATIONS.

NOTE 7: PRIME WALL PRIOR TO INSTALLING WOOD PANELING.

INTERIOR MATERIALS LEGEND

CASEWORK & LAMINATED MATERIALS

PL-1 - WILSONART PLASTIC LAMINATE
COLOR: GRAY MESH 4788-38
SS-1 - WILSONART SOLID SURFACE -
COLOR: WHITE STONE 9208CS
SS-2 - WILSONART SOLID SURFACE -
COLOR: HOT STONE 9201GS
WD-1 - WOOD BUTCHERBLOCK TOP
WP-1 WOOD PANELING - REFER TO A6.1 INTERIOR ELEVATIONS

RESILIENT FLOORING

RFT-1 - ROPPE RUBBER TILE
SIZE: 24" SQUARE
COLOR: F404 NIEBLA
Surface Pattern: Hammered
ROPPE STAIR TREAD /ACCESSORIES - 8' LENGTHS
#95 tread/riser combination.
Surface Pattern: Hammered
w/2" black heavy duty abrasive strip on edge.
COLOR: F404 NIEBLA
RFT-2 - FORBO LINEOLEUM TILE: MCT- 13" SQUARE -
Checkerboard pattern with colors below:
COLORS: MCT-3252 SPARROW AND MCT-3136 CONCRETE
EPX-1 - DURAQUARTZ EPOXY RESIN FLOORING -
2-part epoxy resin flooring -
Color: Q 28-35

SOFT FLOORING - CARPET AND WALK OFF MAT

CPT-1 - MANNINGTON MODULAR CARPET TILE
Pattern: ALIGN
Color: RADIAN 83577
WOM-1 - MANNINGTON - ENTRY SYSTEM TILE
Size: 18" x 36"
Pattern: CHARGE
Color: VECTOR 14362

TILE

PCT-1 - DALTILE - PORCELAIN WALL TILE:
Pattern:ARTICULO
Size: 12" X 24"
Color: COLUMN GREY AR09

PCT-2 - DALTILE PORCELAIN WALL TILE:
FIELD TILE:
Pattern: KONCRETE -
Size: 12" X 24"
Color: BEIGE KC02
- ACCENT TILES:
Pattern: KONCRETE/ WARM CANTINA
Size: 4" X 12"
Color: WARM CATINA KC08
(REFER TO ELEVATIONS FOR LOCATIONS OF ACCENT TILES)

WALL PANELING

WD-1 - 3/4" MAPLE VENEER PLYWOOD WALL PANELING:
CLEAR FINISH, VENEER EDGE BANDING; SEE ELEVATIONS AND DETAILS

WALL BASE -

RB-1 - ROPPE RUBBER BASE -ROPPE:
Pattern: Pinnacle 4" rubber base
Color : Slate 175
PCT-1 - DALTILE PORCELAIN TILE WALL BASE -
SIZE: 4" X 10"
COLOR: TO MATCH WALL TILE

WB-1 - 5/4x8 CLEAR MAPLE WOOD BASE

PAINT - SHERWIN WILLIAMS

PT-1 - GENERAL WALL PAINT - SW6091 RELIABLE WHITE
PT-2 - INTERIOR TRIM PAINT - SW6523 DENIM
PT-3 - EXTERIOR TRIM PAINT - N/A
PT-4 - ACCENT PAINT COLORS:
PT- 4A - SW 7702 SPICED CIDER
PT- 4B - SW 7619 LABRADORITE
PT- 4C - SW 7695 MESA TAN

PT-5 - CEILING WHITE

ACOUSTICAL MATERIALS

ACT-1 - ARMSTRONG ACOUSTICAL CEILING TILE
Pattern: SCHOOL ZONE
ACT-2 - ARMSTRONG ACOUSTICAL CEILING TILE
Pattern: CERAMAGARD
ACT-3 - ARMSTRONG ACOUSTICAL CEILING TILE
Pattern: ULTIMA HIGH NRC

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TOWN OF SANBORNTON, NH

573 SANBORN RD
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SHEET TITLE:
SCHEDULES

A2.1

SCHEDULES
A2.1

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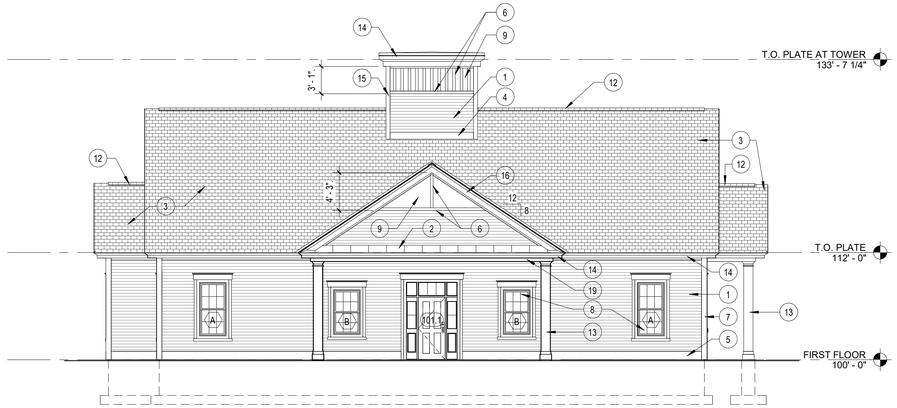
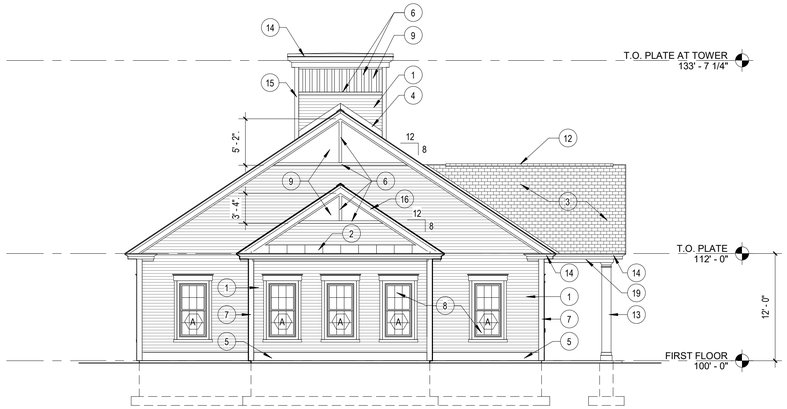


2 SOUTH ELEVATION
A3.1 Scale: 1/8" = 1'-0"



1 WEST ELEVATION
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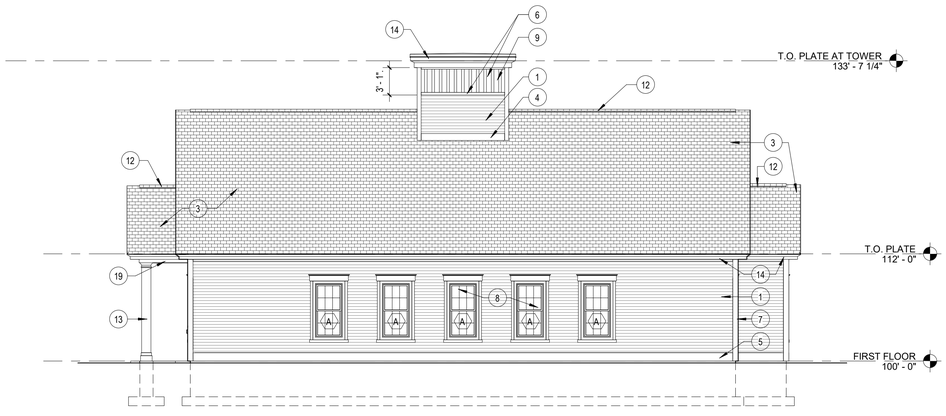

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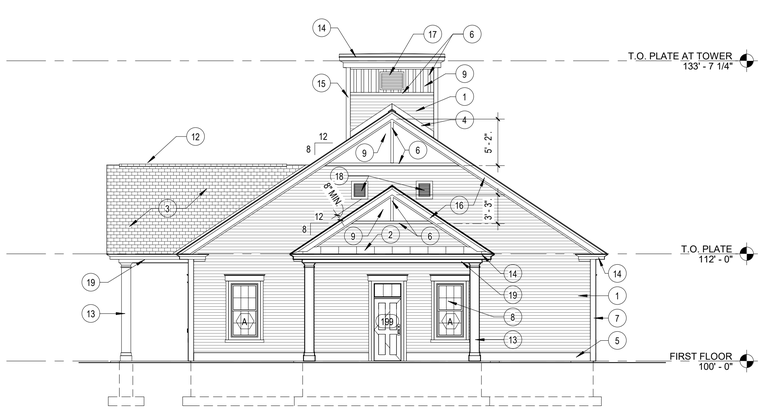
A3.1 Scale: 1/8" = 1'-0"



4 EAST ELEVATION
A3.1 Scale: 1/8" = 1'-0"

GENERAL ELEVATION NOTES

1. FINISH FLOOR ELEVATION = XXX'-X". -(X) = DISTANCE OF GRADE BELOW FFE IN INCHES. + X = DISTANCE OF GRADE ABOVE FFE IN INCHES. FINISH FLOOR ELEVATION OF BUILDING IS REFERENCED AS ARCHITECTURAL DATUM ELEVATION 100'-0", AND IS MEASURED FROM THE TOP OF CONCRETE SLAB. SEE CIVIL DRAWINGS FOR ELEVATIONS BASED ON TOPOGRAPHIC DATUM.
2. DO NOT SCALE DRAWINGS.
3. REFER TO MECHANICAL DRAWINGS FOR LOCATIONS OF LOUVERS AND VENTS. CONFIRM FINAL POSITION WITH ARCHITECT PRIOR TO ORDERING.

ELEVATION LEGEND

(X) - CONSTRUCTION NOTE. SEE LEGEND BELOW

CONSTRUCTION NOTE LEGEND

1. 4" CEDAR CLAPBOARD SIDING w/SOLID STAIN
2. STANDING SEAM METAL ROOFING PANELS
3. ASPHALT SHINGLES
4. 5/4x10 WOOD TRIM
5. 5/4x12 WOOD TRIM, PTD.
6. 1x4 WOOD TRIM, PTD.
7. 5/4x8x8 WOOD CORNER BOARD, PTD.
8. ALUM. CLAD WINDOW UNIT w/WD. SILL, JAMB & HEAD CASING w/CAP MOULDING TO MATCH OLD TOWN HALL, PTD.
9. 1/2" WOOD PANELING, PTD.
10. LED EXTERIOR WALL PACK
11. 5/4x8 WOOD TRIM, PTD.
12. CONT. SHINGLE-COVERED RIDGE VENT
13. BUILT-UP WOOD COLUMN w/BASE & CAP, PTD.
14. BUILT-UP WOOD ROOF EDGE FASCIA, SOFFIT & FRIEZE BOARD, PTD.
15. 5/4x6x6 WOOD CORNER BOARD, PTD.
16. BUILT-UP WOOD CROWN MOULDING, RAKEBOARD, SOFFIT & FRIEZE BOARD, PTD.
17. LOUVER, SEE MECH. DWG'S.
18. MECH. WALL VENT w/1X4 WD. CASING, SEE MECH. DWG'S.
19. BUILT-UP WD. BEAM ENCLOSURE, PTD.

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EXTERIOR ELEVATIONS

A3.1

EXTERIOR ELEVATIONS A3.1

1/8" = 1'-0" 0' 4' 8' 16' 32' 64'
3/32" = 1'-0" 0' 8' 16' 32' 64'
1/16" = 1'-0" 0' 8' 16' 32'

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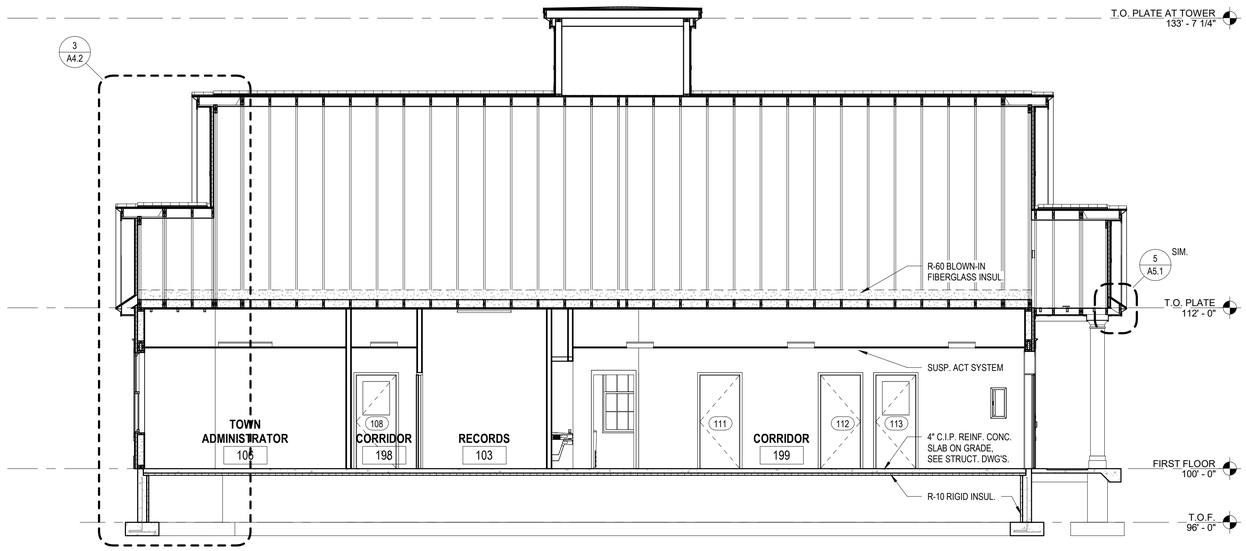
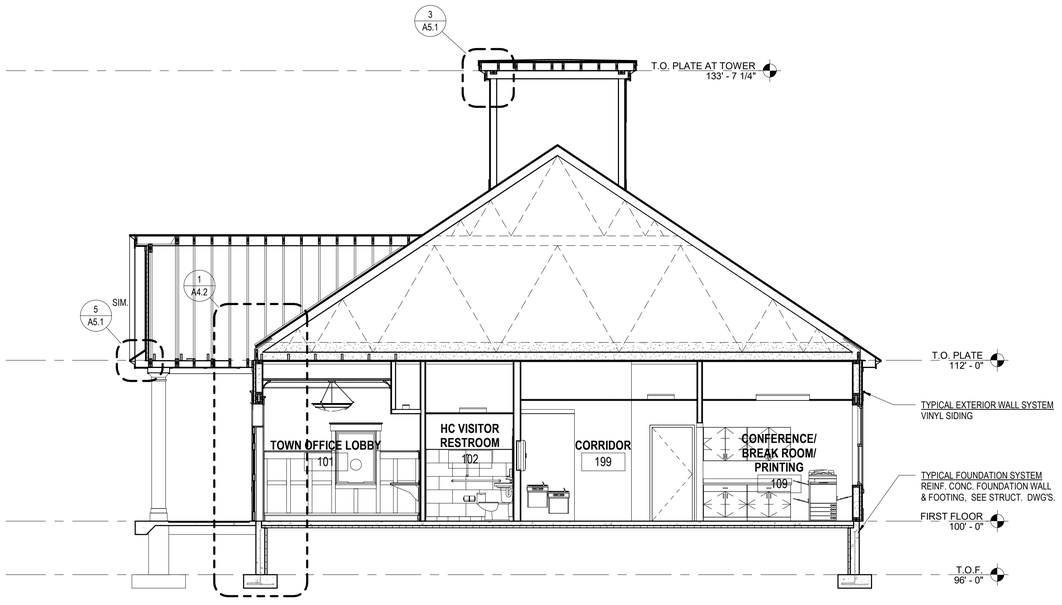


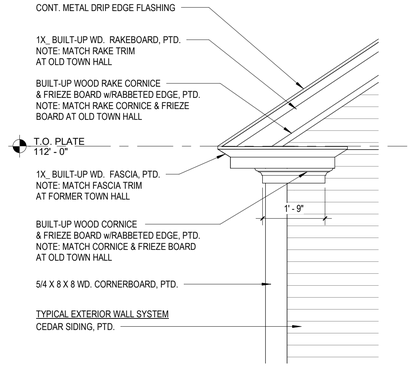
1 A4.1 **BUILDING SECTION A**

Scale: 3/16" = 1'-0"



2 A4.1 **BUILDING SECTION B**

Scale: 3/16" = 1'-0"



3 A4.1 **ELEVATION DETAIL - EAVE & SOFFIT RETURN**

Scale: 1/2" = 1'-0"

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ELEVATION DETAIL & BUILDING SECTIONS

A4.1

ELEVATION DETAIL & BUILDING SECTIONS

A4.1

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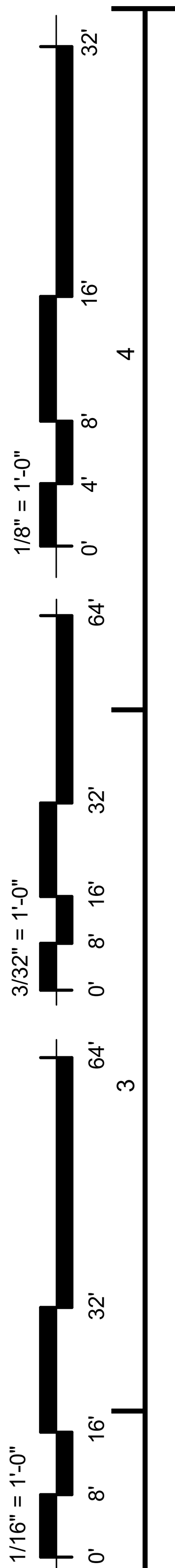
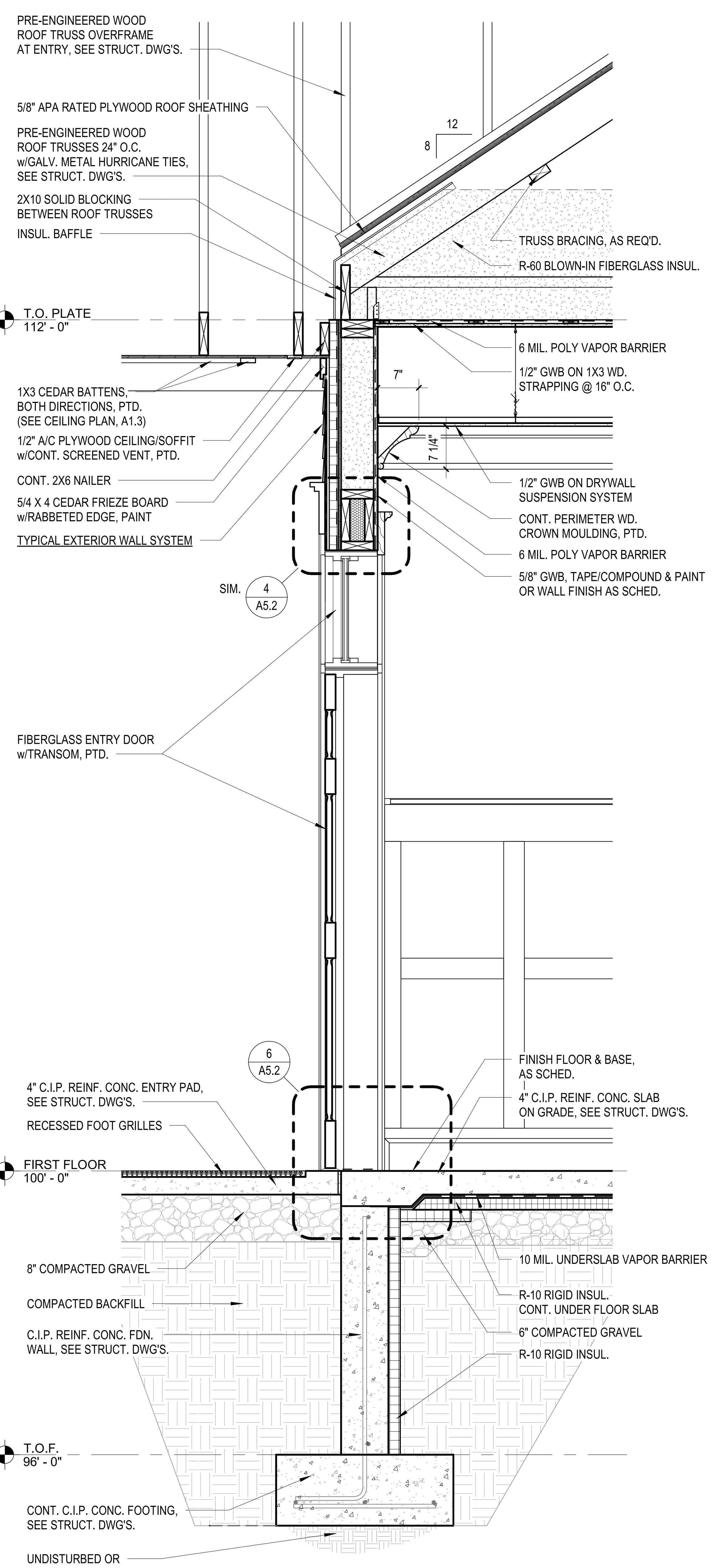
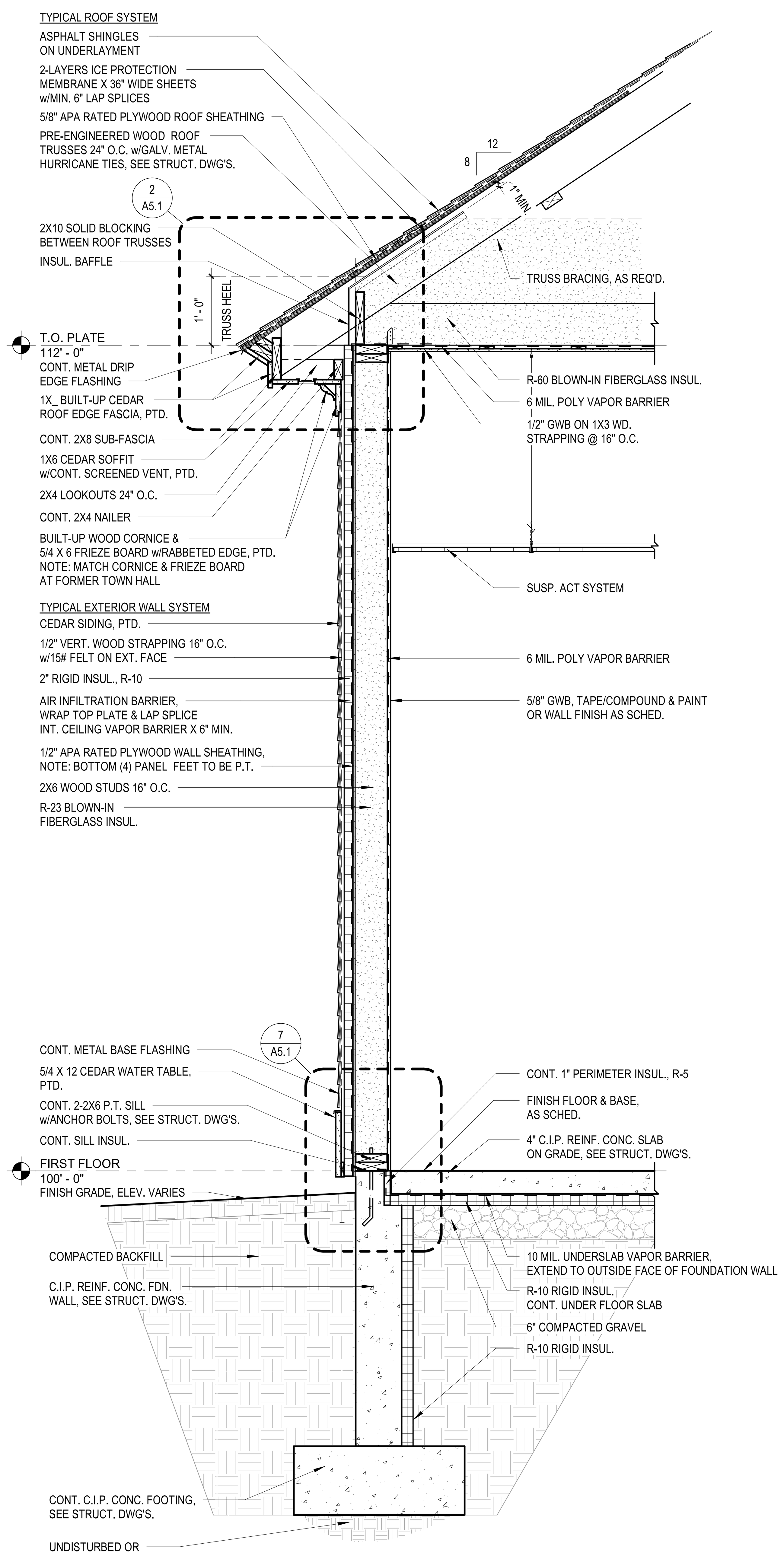
1/8" = 1'-0" 32' 16' 8' 4' 0' 64' 32' 16' 8' 0' 64' 32' 16' 8' 0'
3/32" = 1'-0"
1/16" = 1'-0"
4
3
2
1

A B C D E F

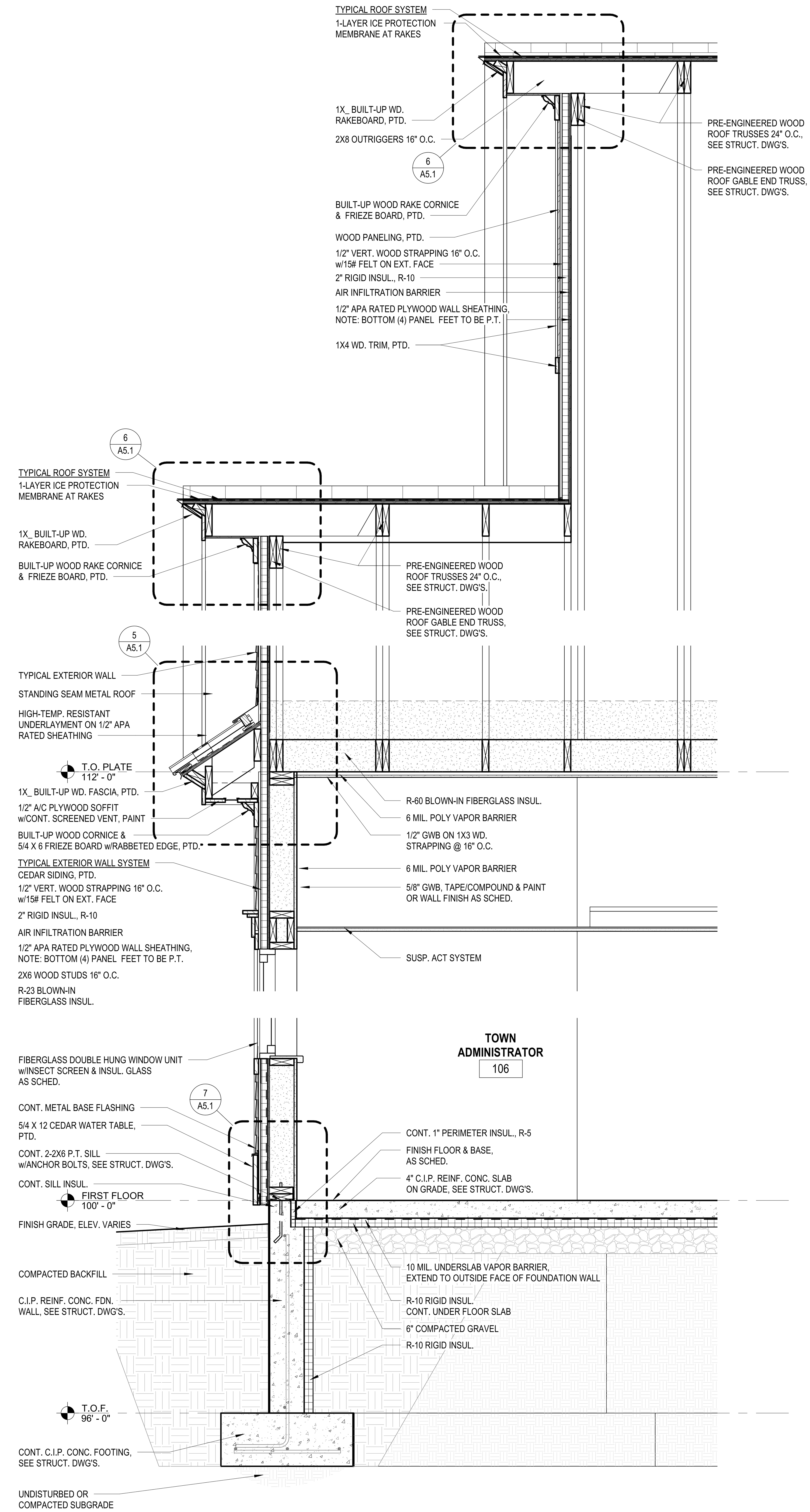




1 A4.2 **WALL SECTION AT ENTRY**
Scale: 3/4" = 1'-0"



2 A4.2 **TYPICAL WALL SECTION**
Scale: 3/4" = 1'-0"



3 A4.2 **GABLE END WALL SECTIONS**
Scale: 3/4" = 1'-0"

A B C D E F

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WALL SECTIONS

A4.2

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WALL SECTIONS

A4.2

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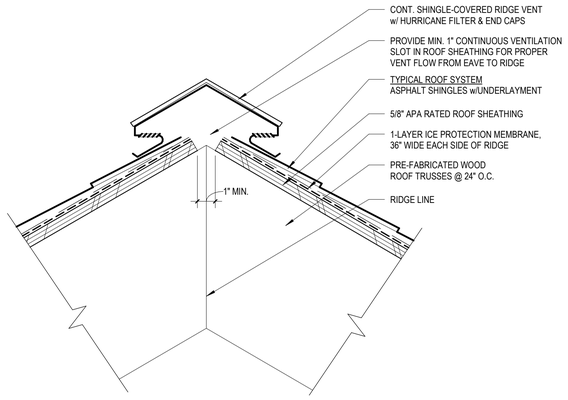
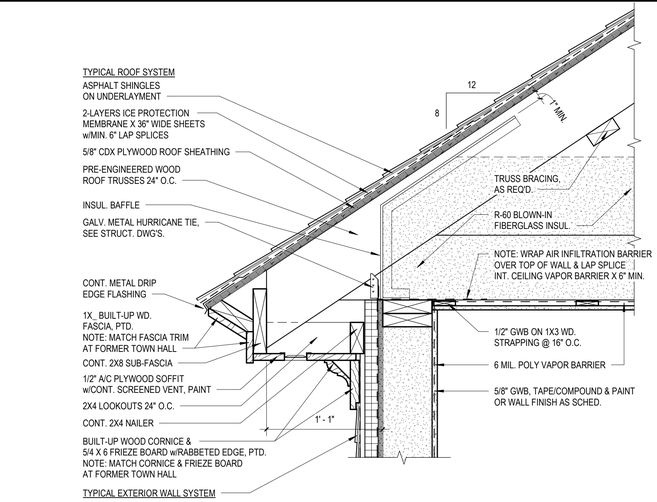


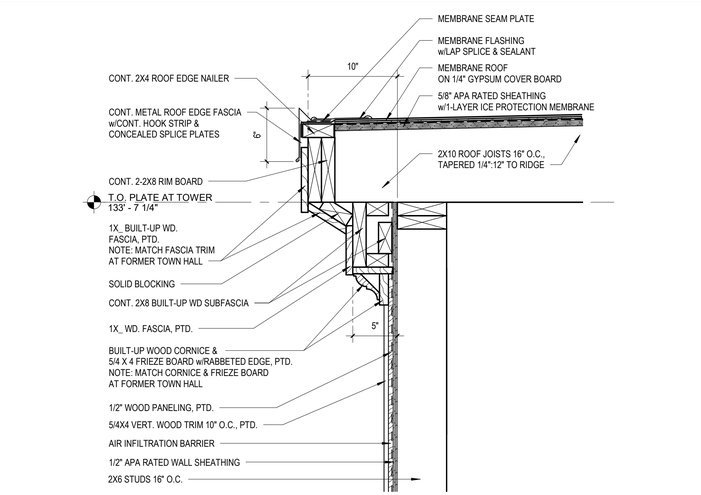
1 A5.1 DETAIL - TYPICAL RIDGE VENT

Scale: 3" = 1'-0"



2 A5.1 DETAIL - TYPICAL EAVE

Scale: 1 1/2" = 1'-0"



3 A5.1 DETAIL - TOWER ROOF EDGE

Scale: 1 1/2" = 1'-0"

4 A5.1 DETAIL - VALLEY FLASHING

Scale: 1 1/2" = 1'-0"

5 A5.1 DETAIL - GABLE END ROOF EDGE

Scale: 1 1/2" = 1'-0"

6 A5.1 DETAIL - TYPICAL ROOF RAKE

Scale: 1 1/2" = 1'-0"

8 A5.1 PLAN DETAIL - ENTRY COLUMN ENCLOSURE

Scale: 1 1/2" = 1'-0"

7 A5.1 DETAIL - BASE OF WALL

Scale: 1 1/2" = 1'-0"

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SECTION DETAILS

A5.1

SECTION DETAILS

A5.1

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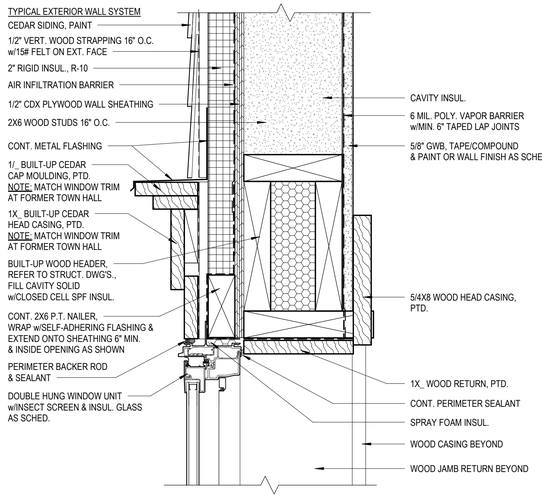

1 DETAIL - WINDOW HEAD
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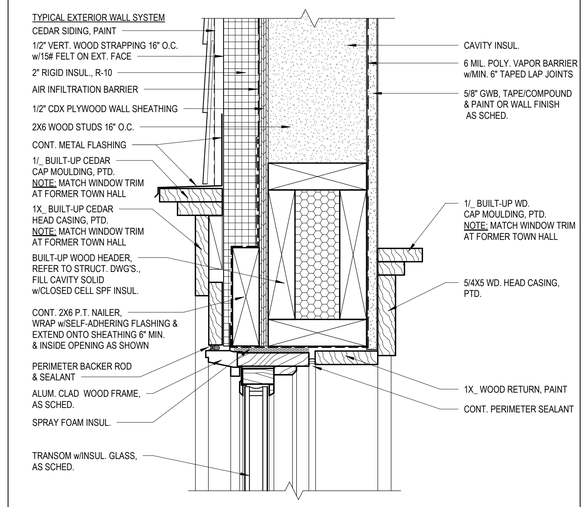
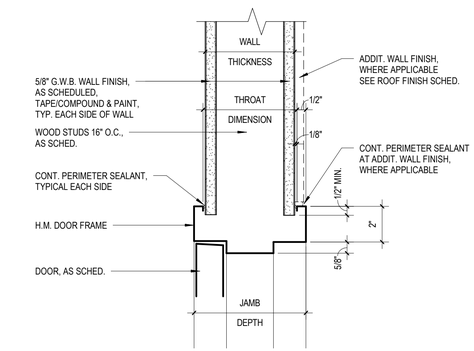
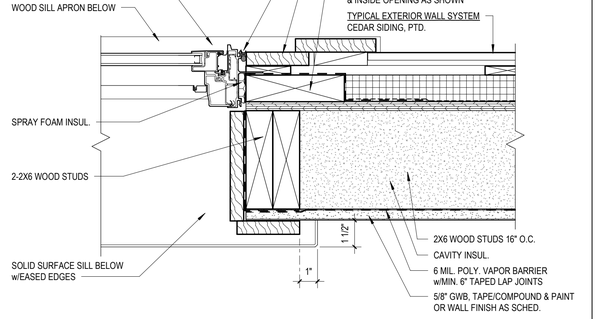


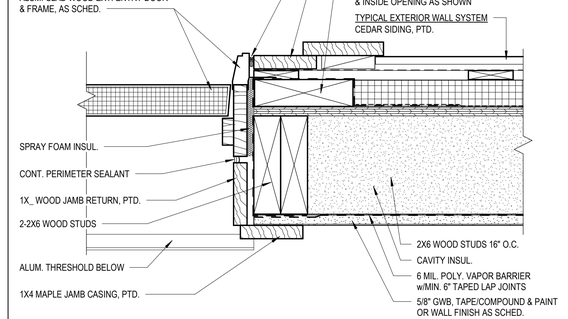
4 DETAIL - EXTERIOR DOOR HEAD
Scale: 3" = 1'-0"



7 DETAIL - DOOR HEAD - STUD WALL
Scale: 3" = 1'-0"



2 DETAIL - WINDOW JAMB
Scale: 3" = 1'-0"



5 DETAIL - EXTERIOR DOOR JAMB
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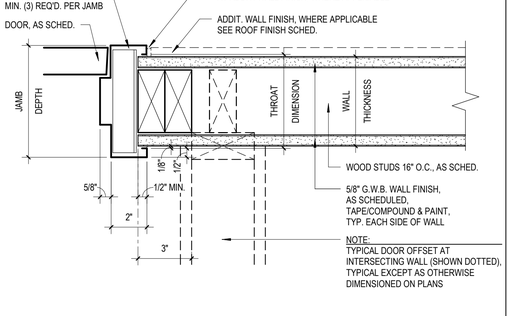
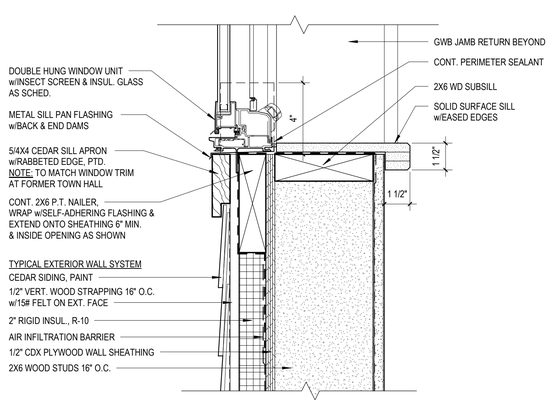


8 DETAIL - DOOR JAMB - STUD WALL
Scale: 3" = 1'-0"



3 DETAIL - WINDOW SILL
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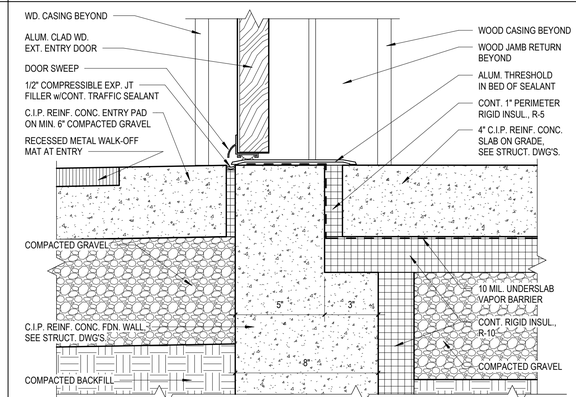

6 DETAIL - EXTERIOR DOOR SILL
Scale: 3" = 1'-0"

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DOOR & WINDOW DETAILS

A5.2

DOOR & WINDOW DETAILS
A5.2

1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

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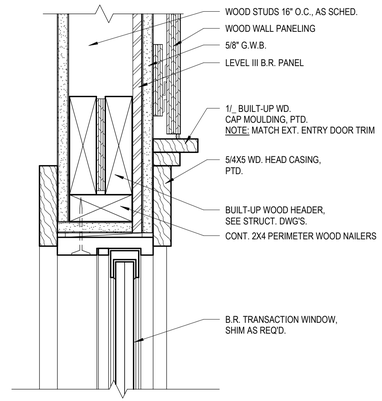

1 A5.3 DETAIL - TRANSACTION WINDOW HEAD
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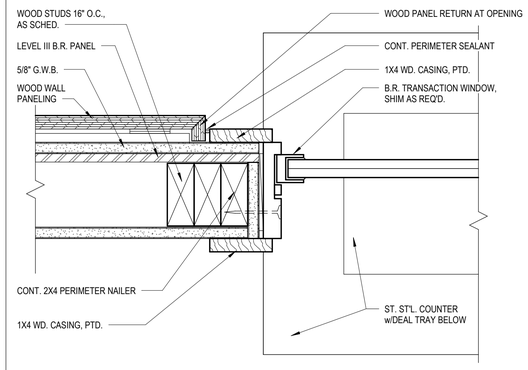

2 A5.3 DETAIL - TRANSACTION WINDOW JAMB
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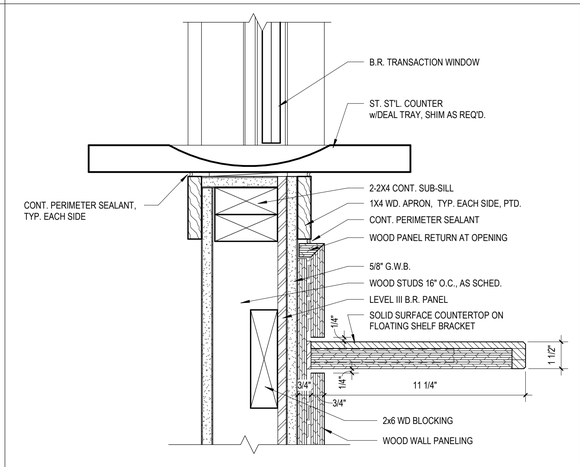

3 A5.3 DETAIL - TRANSACTION WINDOW SILL
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PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	3" = 1'-0"
DESN. BY:	RDP
DRAWN BY:	EJD
CHKD BY:	RDP
ISSUE DATE:	10/20/2021

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REVISIONS

SHEET TITLE:
WINDOW & MISCELLANEOUS DETAILS

A5.3

A5.3 WINDOW & MISCELLANEOUS DETAILS

1/8" = 1'-0" 3/32" = 1'-0" 1/16" = 1'-0"

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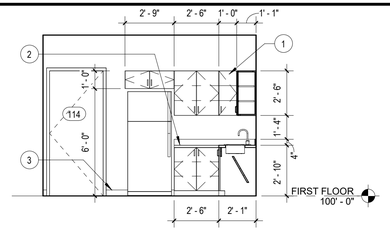

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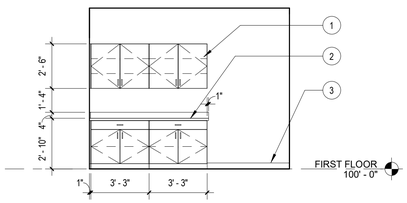
Scale: 1/4" = 1'-0"



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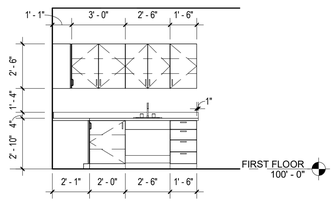

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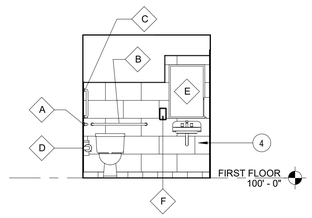

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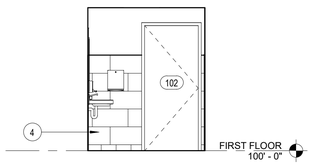

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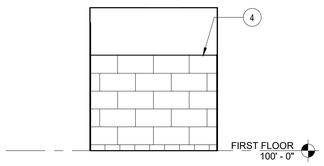

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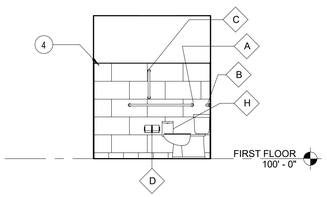

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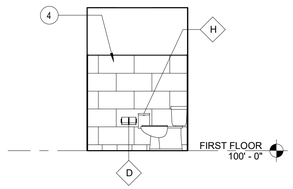

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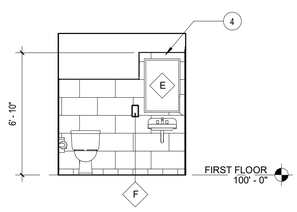

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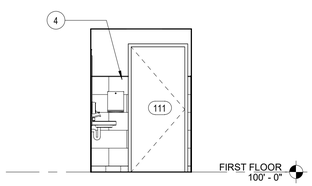

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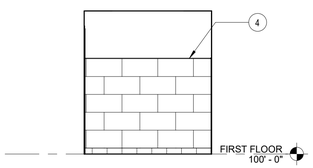

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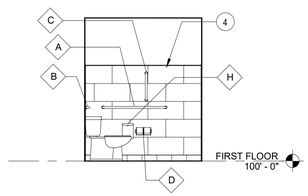

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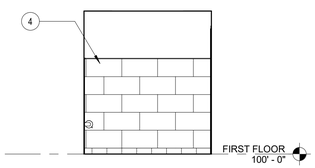

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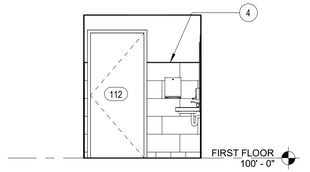

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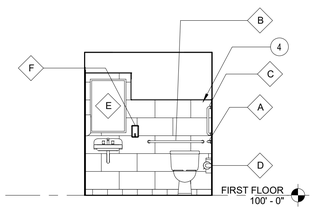

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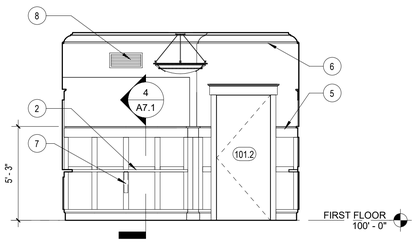
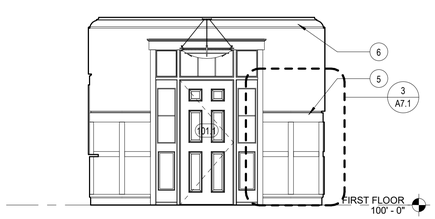


16 A6.1 TOWN OFFICE LOBBY - NORTH
Scale: 1/4" = 1'-0"

17 A6.1 TOWN OFFICE LOBBY - EAST
Scale: 1/4" = 1'-0"



18 A6.1 TOWN OFFICE LOBBY - SOUTH
Scale: 1/4" = 1'-0"

19 A6.1 TOWN OFFICE LOBBY - WEST
Scale: 1/4" = 1'-0"

TOILET ACCESORIES LEGEND

MARK	DESRIPTION	COMMENTS
A	42" GRAB BAR	
B	36" GRAB BAR	
C	18" VERTICAL GRAB BAR	
D	TOILET TISSUE DISPENSER	
E	24" x 36" MIRROR	
F	SOAP DISPENSER	
H	SANITARY NAPKIN DISPOSAL	

INTERIOR MATERIALS LEGEND

NOTE: REFER TO A2.1 FOR FULL MATERIAL DESCRIPTIONS FOR THE OUTLINE KEY

X - CONSTRUCTION NOTE. SEE LEGEND BELOW

INTERIOR ELEVATION NOTES

1. CABINETS; SEE ROOM FIN. SCHED.
2. COUNTERTOP & BACKSPLASH; SEE ROOM FINISH SCHED.
3. WALL BASE; SEE ROOM FIN. SCHED.
4. PORCELAIN WALL TILE TO 5'-4" A.F.F.; SEE ROOM FIN. SCHED.
5. MAPLE WAINSCOT WALL PANELING
6. MAPLE CROWN MOLDING
7. STUD-MOUNTED STEEL COUNTER SUPPORT BRACKET
8. WALL-MOUNTED VENT, SEE MECH. DWG'S.

TURNER GROUP

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
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INTERIOR ELEVATIONS

A6.1

INTERIOR ELEVATIONS
A6.1

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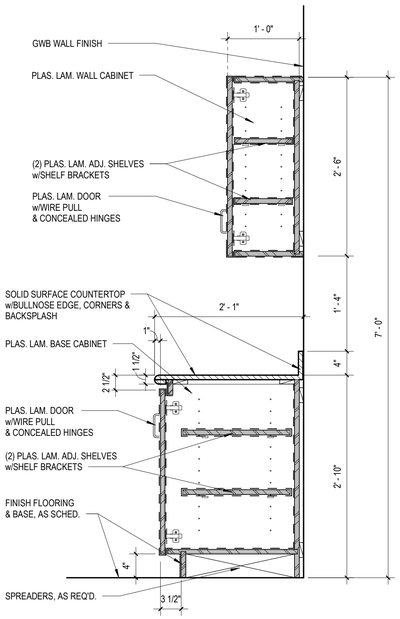
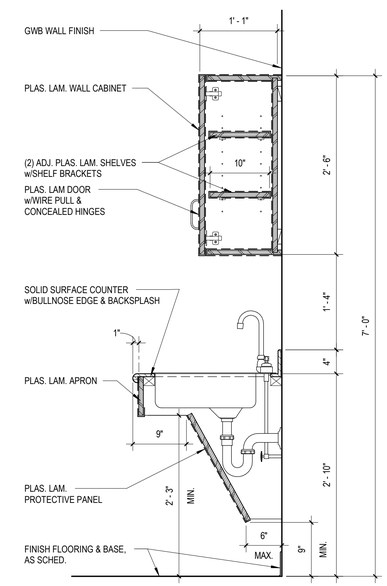
1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

A B C D E F



1 A7.1 **TYP. PLAS. LAM. CASEWORK**

Scale: 1" = 1'-0"



2 A7.1 **COUNTER & CASEWORK**

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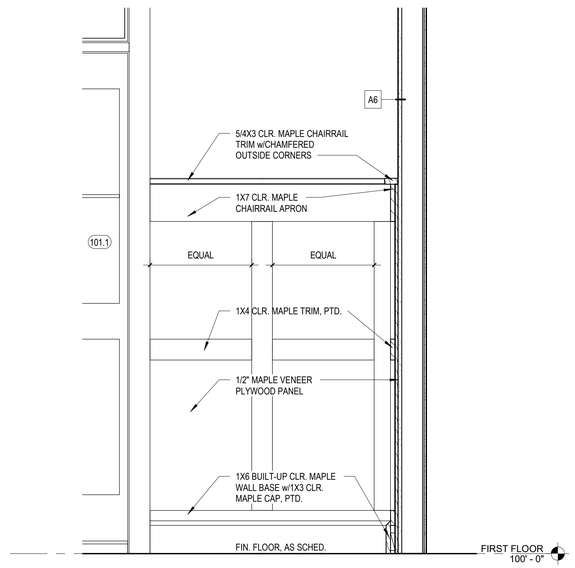
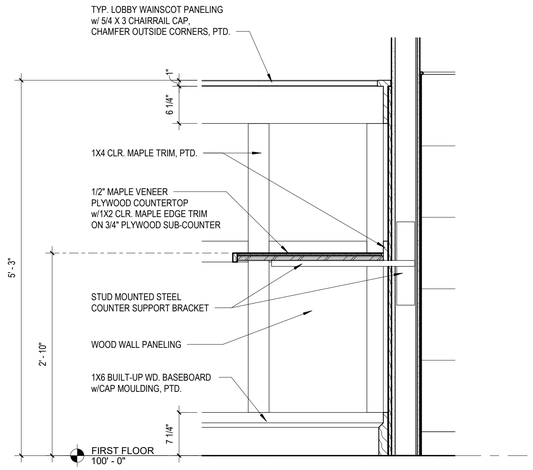


3 A7.1 **DETAIL - TYPICAL LOBBY WAINSCOT**

Scale: 1" = 1'-0"



4 A7.1 **DETAIL - LOBBY COUNTERTOP**

Scale: 1" = 1'-0"

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

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REVISIONS

SHEET TITLE:

MISCELLANEOUS DETAILS

A7.1

MISCELLANEOUS DETAILS A7.1

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1/8" = 1'-0" 32' 16' 8' 4' 0' 4
3/32" = 1'-0" 64' 32' 16' 8' 0' 3
1/16" = 1'-0" 64' 32' 16' 8' 0' 2 1

A B C D E F

ABBREVIATION

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
AAV	AUTOMATIC AIR VENT	Nc	NOISE CRITERIA
AC	AIR CONDITIONING	NC	NORMALLY CLOSED
ACV	AUTOMATIC CONTROL VALVE	NEC	NATIONAL ELECTRIC CODE
AD	ACCESS DOOR	NIC	NOT IN CONTRACT
AFM	AIR FLOW MEASURING DEVICE	NO	NORMALLY OPEN
AFF	ABOVE FINISHED FLOOR	NOM	NOMINAL
AHU	AIR HANDLING UNIT	OA	OUTSIDE AIR
AL	ACOUSTICAL LINING	OAI	OUTSIDE AIR INTAKE
ALD	ACOUSTICALLY LINED DUCT	OBD	OPPOSED BLADE DAMPER
AP	ACCESS PANEL	OC	ON CENTER
ASJ	ALL SERVICE JACKET	OED	OPEN-ENDED DUCT
ATC	AUTOMATIC TEMPERATURE CONTROL	P	PUMP
BB	BASEBOARD RADIATION	PCF	POUNDS PER CUBIC FOOT
BDD	BACKDRAFT DAMPER	PD	PRESSURE DROP
BFP	BACKFLOW PREVENTER	PEX	CROSSLINKED POLYETHYLENE
BOD	BOTTOM OF DUCT	PRV	PRESSURE REDUCING VALVE
BTU	BRITISH THERMAL UNIT	PSI	POUNDS PER SQUARE INCH
BTUH	BRITISH THERMAL UNIT PER HOUR	PSIG	POUNDS PER SQUARE INCH GAUGE
BTUH	BRITISH THERMAL UNIT PER HOUR	P/T	PRESSURE/TEMPERATURE TEST PORT
CBD	COUNTERBALANCED DAMPER	PVC	POLYVINYL CHLORIDE
CHWR	CHILLED WATER RETURN	R	RETURN
CHWS	CHILLED WATER SUPPLY	RA	RETURN AIR
CL	CENTERLINE	RH	RELATIVE HUMIDITY, REHEAT
CO	CARBON MONOXIDE	RL	REFRIGERANT LIQUID PIPING
CO_2	CARBON DIOXIDE	RP	RADIANT PANEL
CPVC	CHLORINATED POLYVINYL CHLORIDE	RPM	REVOLUTIONS PER MINUTE
CU	CONDENSING UNIT	RS	REFRIGERANT SUCTION PIPING
CUH	CABINET UNIT HEATER	RTU	ROOF TOP AIR CONDITIONING UNIT
CV	CONSTANT VOLUME	S	SUPPLY; SILENCER
CFM	CUBIC FEET PER MINUTE	SA	SUPPLY AIR
CTE	CONNECT TO EXISTING	SF	SUPPLY FAN
CW	COLD WATER	SP	STATIC PRESSURE (IN. WG)
CWR	CONDENSATE WATER RETURN	SQ. IN.	SQUARE INCHES
CWS	CONDENSATE WATER SUPPLY	TOD	TOP OF DUCT
D	DAMPER	TS	TEMPERATURE SENSOR
DB	DRY BULB TEMPERATURE, °F	TSP	TOTAL STATIC PRESSURE (IN. WG)
dB	DECIBELS	TYP	TYPICAL
DEG	DEGREES	UH	UNIT HEATER
DEG.F	DEGREES FAHRENHEIT	UTR	UP THROUGH ROOF
DIA	DIAMETER	UV	UNIT VENTILATOR
DN	DOWN	VAV	VARIABLE AIR VOLUME
DP	DEW POINT TEMPERATURE, °F	VD	VOLUME DAMPER
DX	DIRECT EXPANSION	VFD	VARIABLE FREQUENCY DRIVE
E	EXISTING, EXHAUST	W	WATTS
EA	EXHAUST AIR	WB	WET BULB TEMPERATURE, °F
EAT	ENTERING AIR TEMPERATURE, °F	WC	WATER COLUMN
EBB	ELECTRIC BASEBOARD HEATER	WG	WATER GAUGE
EC	ELECTRIC COIL, EVAPORATOR COIL	WWM	WELDED WIRE MESH
EDB	ENTERING DRY BULB	W/	WITH
EF	EXHAUST FAN		
EH	ELECTRIC HEATER		
EL	EXPANSION LOOP		
ESP	EXTERNAL STATIC PRESSURE (IN. WG)		
ET	EXPANSION TANK		
EWB	ENTERING WET BULB		
EWT	ENTERING WATER TEMPERATURE, °F		
EX	EXPANSION TANK		
EXG	EXISTING		
EXH	EXHAUST		
EXIST	EXISTING		
(E)	EXISTING		
F	FAHRENHEIT		
FC	FLEXIBLE CONNECTOR		
FD	FIRE DAMPER		
FLA	FULL LOAD AMPS		
FN	FURNACE		
FO	FLAT OVAL		
FPF	FINS PER FOOT		
FPI	FINS PER INCH		
FPM	FEET PER MINUTE		
FR	FINTUBE RADIATION		
FTK	FOIL-SCRIM-KRAFT		
WG	FEET		
	FEET WATER GAUGE		
F&T	FLOAT & THERMOSTATIC		
FTR	FIN TUBE RADIATION		
GAL	GALLON(S)		
GPH	GALLONS PER HOUR		
GPM	GALLONS PER MINUTE		
GSR	GEOTHERMAL SOURCE RETURN		
GSS	GEOTHERMAL SOURCE SUPPLY		
GWR	GLYCOL WATER RETURN		
GWS	GLYCOL WATER SUPPLY		
HC	HEATING COIL		
HG	HOT GAS PIPING		
HRU	HEAT RECOVERY UNIT		
HRV	HEAT RECOVERY VENTILATOR		
HWP	HOT WATER PUMP		
HWR	HEATING WATER RETURN		
HWS	HEATING WATER SUPPLY		
HP	HORSE POWER		
HW	HOT WATER		
I.D.	IRIS DAMPER		
WG	INCHES		
	INCHES WATER GAUGE		
IWH	INDIRECT WATER HEATER		
kW	KILOWATT		
L	LOUVER		
LAT	LEAVING AIR TEMPERATURE, °F		
LBS	POUNDS		
LDB	LEAVING DRY BULB, °F		
LF	LINEAR FEET		
LPC	LOW PRESSURE CONDENSATE		
LPS	LOW PRESSURE STEAM (15 PSIG OR LESS)		
LPCC	LOW PRESSURE CLEAN CONDENSATE		
LPCS	LOW PRESSURE CLEAN STEAM (15 PSIG OR LESS)		
LWT	LEAVING WATER TEMPERATURE, °F		
MAX	MAXIMUM		
MBH	THOUSAND BTU PER HOUR		
MCA	MINIMUM CIRCUIT AMPACITY		
MD	MOTORIZED DAMPER		
MFG	MANUFACTURING		
MFR	MANUFACTURER		
MIN	MINIMUM		
MOCP	MAXIMUM OVER CURRENT PROTECTION		
MUA	MAKE-UP AIR		

APPARATUS

SYMBOL	DESCRIPTION
S	SMOKE DETECTOR
P	PRESSURE GAUGE
H	HUMIDISTAT
HS	HUMIDITY SENSOR
T	THERMOSTAT
TS	TEMPERATURE SENSOR
M	MOTOR
T	THERMOMETER (DIAL TYPE) IN WELL
C	CARBON DIOXIDE SENSOR
D	DISCONNECT SWITCH
MS	MOTOR STARTER
CT	CONTACTS
P	PRESSURE SENSOR
T	TEMPERATURE SENSOR (PIPE OR DUCT)
F	FLOW SENSOR
H	HUMIDITY SENSOR (DUCT)
VFD	VARIABLE FREQUENCY DRIVE
S	SWITCH
M	PARALLEL BLADE MOTORIZED DAMPER
M	OPPOSED BLADE MOTORIZED DAMPER
FSD	COMBINATION FIRE SMOKE DAMPER
	EQUIPMENT TAGS
XX / #	SHOWN IN HEXAGON BELOW REQUIRE ELECTRICAL POWER LOWER VALUE - EQUIPMENT TAG NUMBER UPPER VALUE - EQUIPMENT DESIGNATION
AC / 1	AIR CONDITIONING UNIT
AHU / 1	AIR HANDLING UNIT
B / 1	BOILER
CH / 1	CABINET HEATER
CU / 1	CONDENSING UNIT
EBB / 1	ELECTRIC BASEBOARD HEATER
EH / 1	ELECTRIC HEATER
ERV / 1	ENERGY RECOVERY VENTILATOR
EF / 1	EXHAUST FAN
FC / 1	FAN COIL UNIT
FN / 1	FURNACE
HRV / 1	HEAT RECOVERY VENTILATOR
HVAC / 1	HVAC UNIT
MUA / 1	MAKE UP AIR UNIT
P / 1	PUMP
RF / 1	RETURN FAN
RTU / 1	ROOF TOP UNIT
SF / 1	SUPPLY FAN
UH / 1	UNIT HEATER
AS / 1	NON-ELECTRIC EQUIPMENT DESIGNATION AIR SEPARATOR
DC / 1	DUCT COIL
ET / 1	EXPANSION TANK
RP / 1	RADIANT PANEL
S-1 / CFM	AIR DISTRIBUTION DEVICE DESIGNATION UPPER VALUE - DEVICE TYPE / TAG # X = EXISTING TO BE REUSED LOWER VALUE - AIR FLOW QUANTITY IN CFM
D-1 / CFM	DISPLACEMENT DIFFUSER
E-1 / CFM	EXHAUST GRILLE OR REGISTER
L-1 / CFM	LOUVER
R-1 / CFM	RETURN GRILLE OR REGISTER
S-1 / CFM	SUPPLY DIFFUSER, GRILLE OR REGISTER CEILING DIFFUSER: 4 WAY BLOW EXCEPT WHERE INDICATED OTHERWISE
T-1 / CFM	TRANSFER GRILLE OR REGISTER

SHEET METAL

SYMBOL	DESCRIPTION
	DOUBLE-LINE CONVENTION
S	SUPPLY DUCT UP - SIZE IN INCHES (WxH)
	SUPPLY DUCT DOWN
R or E	EXHAUST OR RETURN DUCT UP
	EXHAUST OR RETURN DUCT DOWN
AD	ACCESS DOOR
	CAP DUCT
R / D	CHANGE OF ELEVATION R = RISE D = DROP
	DOOR UNDERCUT FOR TRANSFER
	DUCT SILENCER
	FLEXIBLE CONNECTION
	FLEXIBLE DUCTWORK
	LOUVER
	RETURN/EXHAUST AIR FLOW DIRECTION
	SUPPLY AIR FLOW DIRECTION
	TURNING VANES (TYP FOR MITERED ELBOWS)
	VOLUME DAMPER (I.D. = IRIS DAMPER)
	SINGLE-LINE CONVENTION
	CEILING SUPPLY DIFFUSER
	CEILING RETURN OR EXHAUST GRILLE
	EXHAUST OR RETURN DOWN
	EXHAUST OR RETURN UP
	SUPPLY DUCT DOWN
	SUPPLY DUCT UP
	CAP DUCT
	LINE TYPES
	EXISTING ITEM TO REMAIN
	EXISTING ITEM TO BE REMOVED
	NEW ITEM
	HIDDEN ITEM
	CONTROL WIRING
	OTHER SYMBOLS
	CONNECT TO EXISTING
Ø	DIAMETER
	FINNED TUBE RADIATIO DESIGNATION
X / MBh / LF	UPPER VALUE - EQUIPMENT DESIGNATION & TAG # LOWER VALUE - MBH VALUE BELOW - ACTIVE LENGTH OF FINNED TUBE ELEMENT. LENGTH SHALL BE AS INDICATED OR REQUIRED TO MEET MBH. ENCLOSURE LENGTH SHALL BE AS REQUIRED TO CONTAIN ELEMENT, VALVES, AND PIPING, UNLESS ENCLOSURE IS INDICATED WALL-TO-WALL.
	RETURN PIPING IN CABINET

PIPING

SYMBOL	DESCRIPTION
	ANGLE GLOBE VALVE
A	AUTOMATIC AIR VENT (AAV)
	BACKFLOW PREVENTER
	BALANCIN VALVE
	BALL VALVE
	BALL VALVE WITH 3/4" GARDEN HOSE END & BRASS CAP
B	BUCKET TRAP
	BUTTERFLY VALVE
	CAPPED PIPE
C	CHEMICAL TREATMENT
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
	COMBINATION BALANCING, FLOW MEASURING, AND SHUT-OFF VALVE (CIRCUIT SETTER)
CD	CONDENSATE DRAIN
	CONNECTION ON BOTTOM OF PIPE
	CONNECTION ON TOP OF PIPE
	DIRECTION OF FLOW
	DIRECTION OF PITCH DOWNWARD
	DOMESTIC COLD WATER PIPING
D	DRAIN LINE
E	ELECTRICALLINE
	EXPANSION JOINT
F	FILL
	FLEXIBLE CONNECTION
	FLOAT & THERMOSTATIC TRAP
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
	FUSIBLE LINK VALVE
GAS	GAS PIPING
	GATE OR BALL VALVE
	GLOBE VALVE
CWR	CONDENSATE WATER RETURN
CWS	CONDENSATE WATER SUPPLY
GR	GLYCOL RETURN
GS	GLYCOL SUPPLY
HWS	HEATING WATER SUPPLY
HWR	HEATING WATER RETURN
LPS	LOW PRESSURE STEAM
LPC	LOW PRESSURE CONDENSATE
	MANUAL AIR VENT
	NON-SLAM CHECK VALVE
	OS&Y VALVE
	PIPE ANCHOR
	PIPE DROP
	PIPE GUIDE
	PIPE RISER
A	PNEUMATIC AIR LINE
P	PRESSURE REDUCING VALVE
P/T	PRESSURE/TEMPERATURE TEST PORT
	PUMP
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
	REDUCER - CONCENTRIC
	REDUCER - ECCENTRIC
	SAFETY VALVE OR PRESSURE RELIEF
	SOLENOID VALVE
S	SPRING CHECK VALVE
	STRAINER (WITH 3/4" BLOW-OFF VALVE)
	SWING CHECK VALVE
	THERMOSTATIC TRAP
	THREE-WAY AUTOMATIC CONTROL VALVE (ACV) ELECTRIC OR ELECTRONIC
	TWO-WAY AUTOMATIC CONTROL VALVE (ACV) ELECTRIC OR ELECTRONIC
	UNION OR FLANGE
V	VENT LINE

GENERAL NOTES

1. GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO DRAWINGS MARKED M-#. SOME ABBREVIATIONS AND SYMBOLS MAY NOT BE APPLICABLE TO THIS PARTICULAR PROJECT - THEY ARE PROVIDED FOR GENERAL REFERENCE ONLY.
2. PLANS ARE NOT INTENDED TO SHOW EVERY DETAIL, DROP, RISE, OR FITTING. DUCT AND PIPING LOCATIONS INDICATED ARE APPROXIMATE. DETERMINE EXACT LOCATIONS IN THE FIELD.
3. COORDINATE WORK OF THIS DIVISION WITH THAT OF OTHER DIVISIONS.
4. COORDINATE WORK WITH THE TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS AT NO ADDITIONAL COST TO THE OWNER.
5. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF AIR DEVICES WHERE APPLICABLE.
6. VERIFY EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT AND PIPE TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE DIMENSIONS BEFORE FABRICATION.
7. PROVIDE ACCESS PANELS, WHERE REQUIRED, TO SERVICE DAMPERS, HEATERS, VALVES AND CONCEALED MECHANICAL EQUIPMENT. PROVIDE ACCESS PANELS AND ACCESS DOORS UPSTREAM OF ELBOWS WITH TURNING VANES.
8. INSTALL EQUIPMENT, PIPING AND DUCTWORK AS REQUIRED TO PROVIDE A VIBRATION-FREE INSTALLATION, AND TO FACILITATE EQUIPMENT ACCESS AS REQUIRED BY EQUIPMENT MANUFACTURER.
9. DUCTWORK SHALL BE GALVANIZED STEEL UNLESS NOTED OTHERWISE, CONSTRUCTED AND INSTALLED ACCORDING TO LATEST SMACNA STANDARDS FOR PRESSURE CLASS AS SPECIFIED. EXPOSED ROUND OR OVAL DUCT SHALL BE SPIRAL SEAM.
10. DUCT SIZES INDICATED ARE "INSIDE-CLEAR" DIMENSIONS. INCREASE OUTSIDE DIMENSIONS TO ALLOW FOR THICKNESS OF INSIDE ACOUSTIC LINING AND OTHER OBSTRUCTIONS.
11. DIFFUSER SIZES INDICATED ARE NECK SIZES; REGISTER AND GRILLE SIZE ARE NOMINAL.
12. PROVIDE FLEXIBLE DUCT CONNECTIONS ON DUCTS CONNECTING TO FANS AND OTHER VIBRATING EQUIPMENT, AND TO AIR HANDLING UNITS WHICH ARE NOT INTERNALLY ISOLATED. ELECTRICALLY-GROUND DUCTS ACROSS CONNECTIONS WITH FLEXIBLE COPPER GROUNDING STRAPS.
13. SEAL DUCT JOINTS, SEAMS AND PENETRATIONS WITH SPECIFIED DUCT SEALANT OR SILICONE, PER SMACNA SEAL CLASS A AND PER APPLICABLE CODES.
14. DUCT ELBOWS SHALL BE LONG-RADIUS ELBOWS EXCEPT WHERE SPACE DOES NOT PERMIT OR AS SPECIFICALLY INDICATED OTHERWISE.
15. PROVIDE 45° OR BELLMOUTH TAKE-OFFS FOR RUNOUTS.
16. PAINT THE INSIDE OF DUCTWORK VISIBLE TO OCCUPANTS THROUGH AN OPENING OR TERMINAL DEVICE, FLAT BLACK.
17. PROVIDE AT LEAST THREE-ELBOW SWINGS FOR PIPE TAKE-OFFS.
18. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS, AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
19. PITCH PIPING 1 INCH PER 20 FEET IN DIRECTION OF FLOW TO DRAINS AND VENTS.
20. PROVIDE CIRCUIT SETTER BALANCING VALVES AT SYSTEM LOOP RETURNS AND AT RETURN RISERS. PROVIDE SHUT-OFF VALVES AT SYSTEM LOOP SUPPLIES AND SUPPLY RISERS.
21. PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS. MANUAL VENTS IN MAINS SHALL CONSIST OF A LINE-SIZED AIR CHAMBER, AN ELBOW DOWNWARD, AND BALL VALVE WITH GARDEN HOSE END AND BRASS GASKETED CAP.
22. INSULATE PIPING AS SPECIFIED. PERFORM TESTS SPECIFIED BEFORE INSULATING.
23. MOUNT ROOM THERMOSTATS AND SENSORS AT ACCESSIBLE HEIGHT AS SPECIFIED IN DIVISION 23 TEMPERATURE CONTROL SYSTEM SPECIFICATION SECTION(S).
24. CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NEC AND DIVISION 26 ELECTRICAL SPECIFICATIONS.
25. PLUMBING WORK: IN ACCORDANCE WITH STATE AND LOCAL CODES.
26. PROVIDE AN AIR GAP OR BREAK AS REQUIRED BY CODE ON EQUIPMENT DRAINS PIPED TO FLOOR DRAINS OR OTHER RECEPTORS.

DRAWING LIST - MECHANICAL

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KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE · THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER · 10/20/2021

REVISIONS

SHEET TITLE:

GENERAL NOTES

M0.1

GENERAL NOTES M0.1

1/8" = 1'-0" : 0' 4' 8' 16' 32' 64'
3/32" = 1'-0" : 0' 8' 16' 32' 64'
1/16" = 1'-0" : 0' 8' 16' 32' 64'

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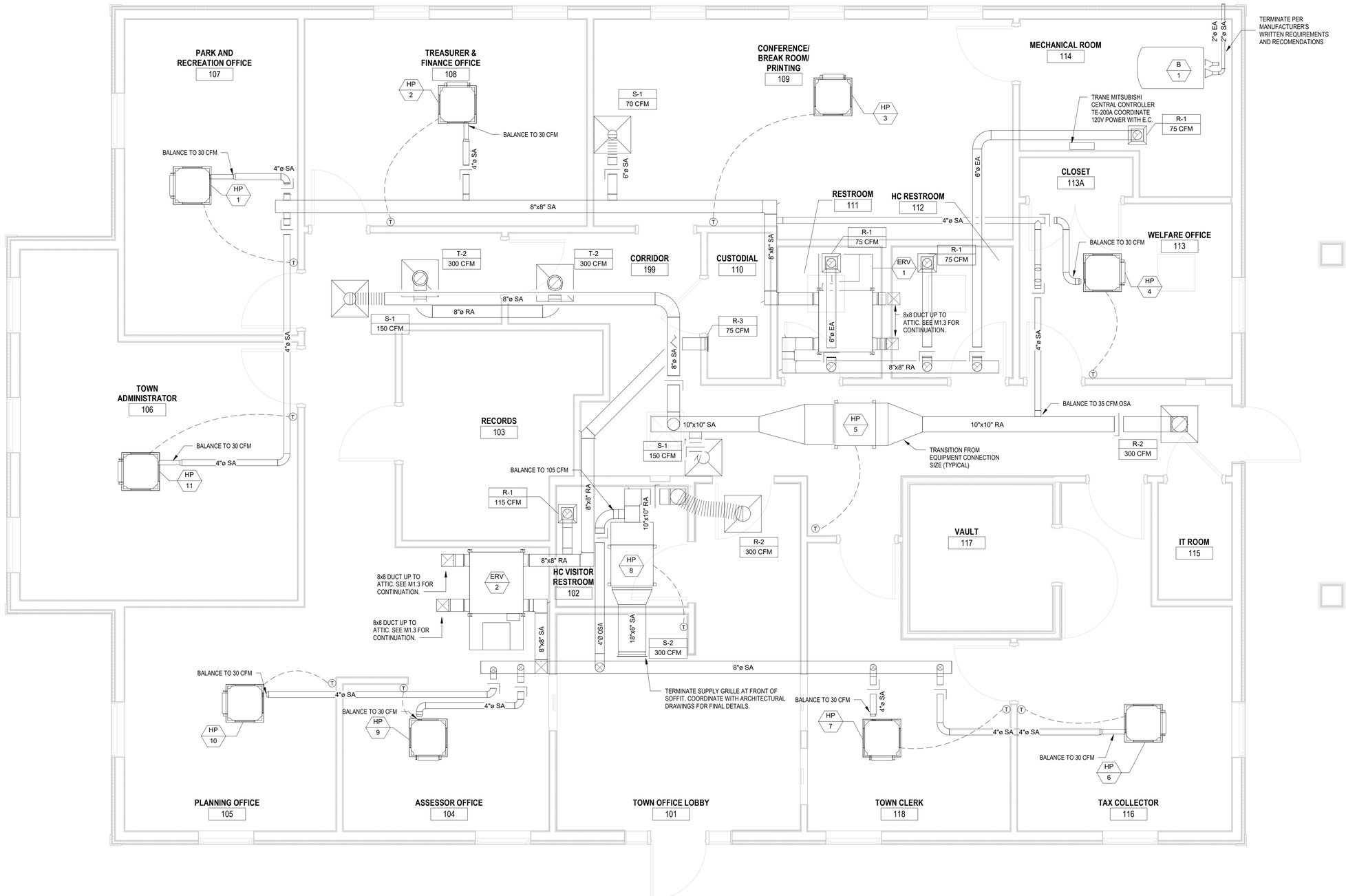

1 M1.1 FIRST FLOOR - DUCTWORK
Scale: 3/8" = 1'-0"

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

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TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

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SHEET TITLE:
FIRST FLOOR - DUCTWORK

M1.1

FIRST FLOOR - DUCTWORK
M1.1

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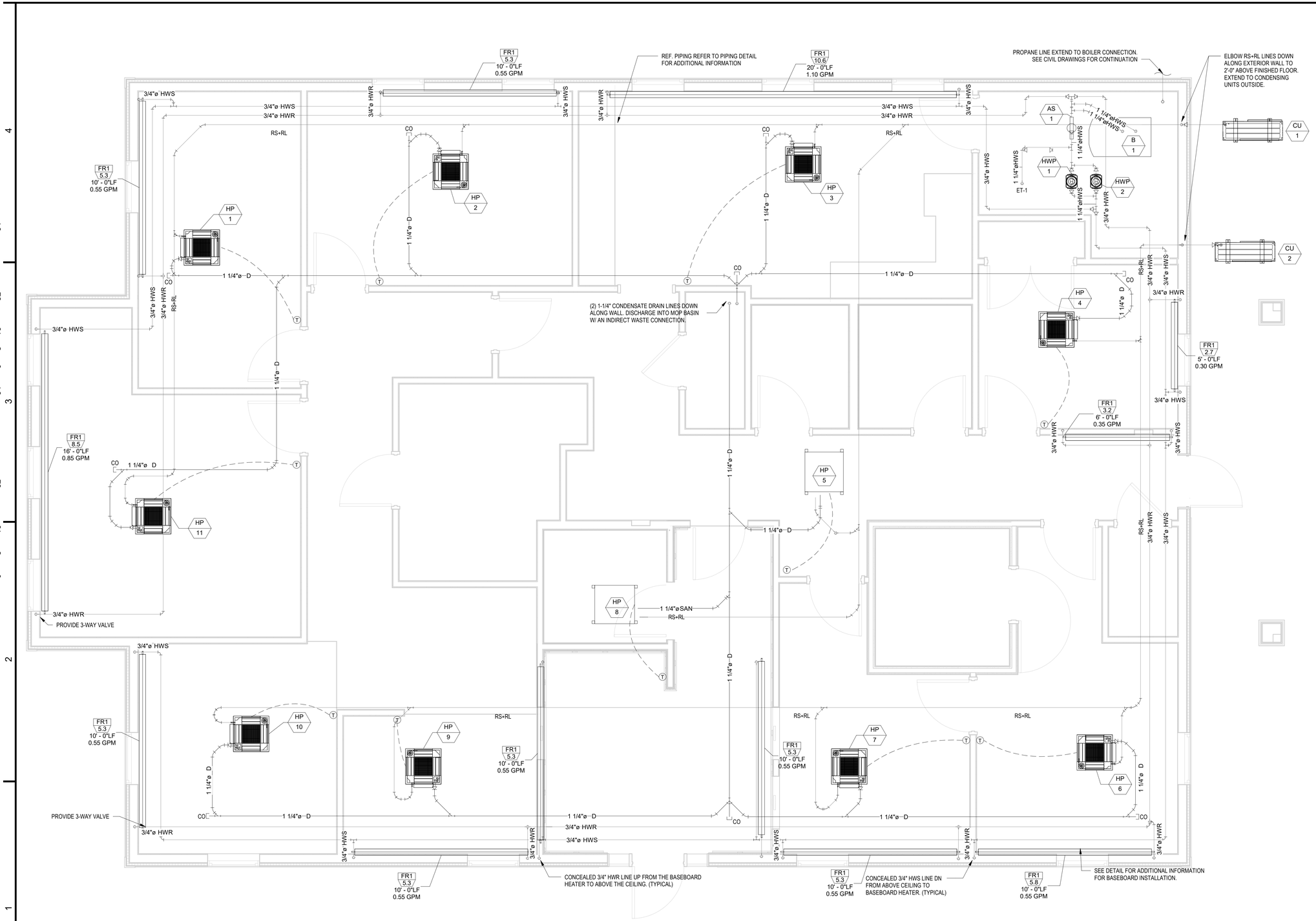

2 FIRST FLOOR - PIPING
M1.2 Scale: 3/8" = 1'-0"

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REVISIONS

SHEET TITLE:
FIRST FLOOR - PIPING

M1.2

FIRST FLOOR - PIPING M1.2

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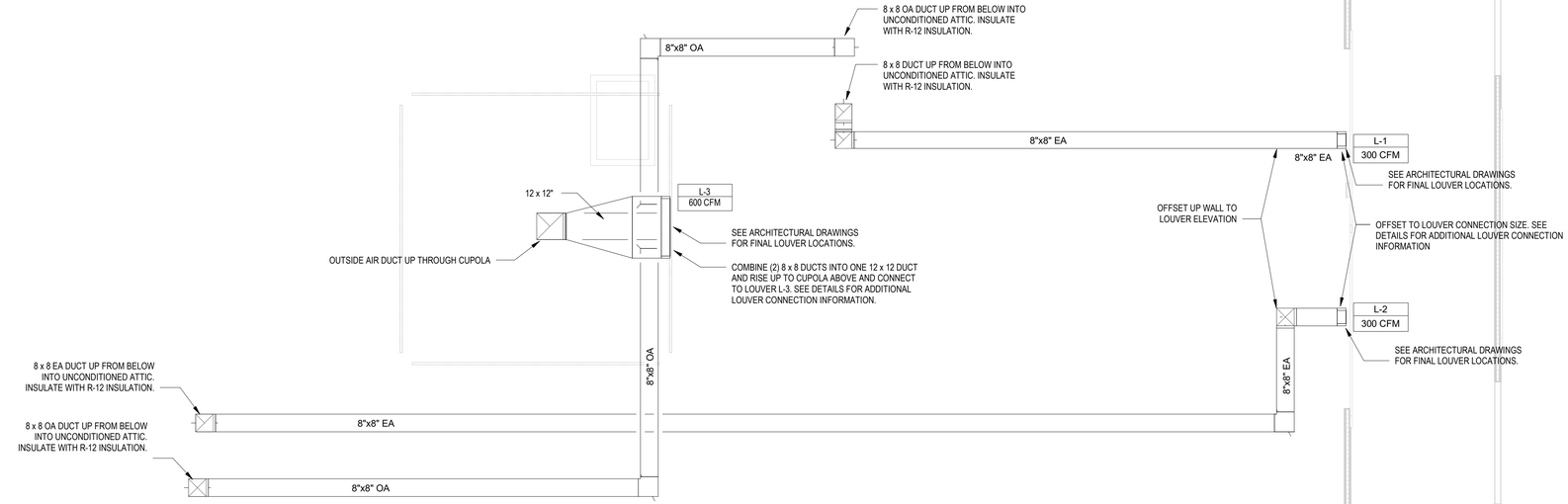

1 M1.3 ATTIC - DUCTWORK
Scale: 3/8" = 1'-0"

1/8" = 1'-0" 32' 16' 8' 4' 0'
3/32" = 1'-0" 64' 32' 16' 8' 0'
1/16" = 1'-0" 64' 32' 16' 8' 0'

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REVISIONS

SHEET TITLE:
ATTIC - DUCTWORK

M1.3

M1.3 ATTIC - DUCTWORK

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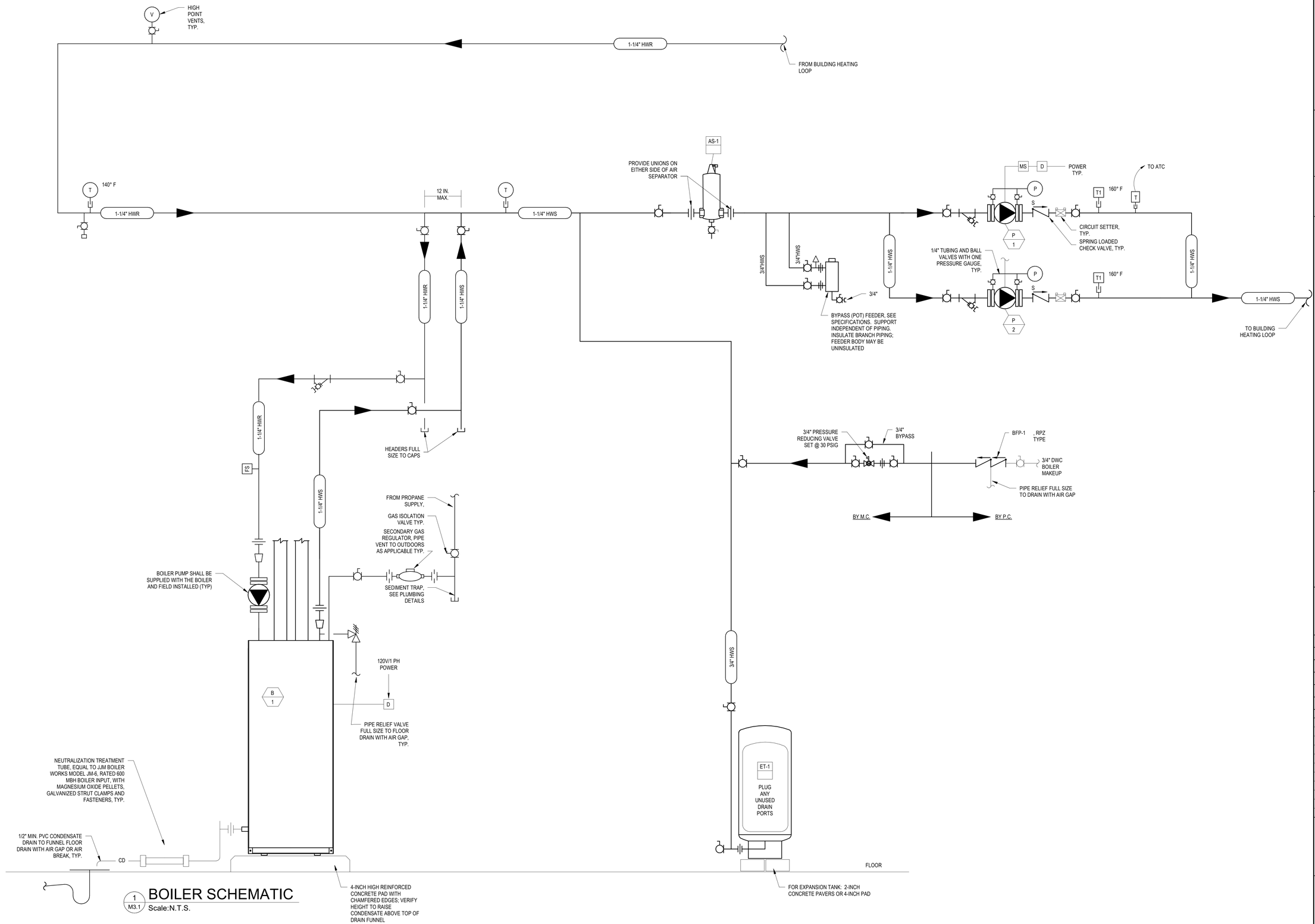

1 M3.1 BOILER SCHEMATIC
Scale:N.T.S.

1/8" = 1'-0" 32' 16' 8' 4' 0'
3/32" = 1'-0" 64' 32' 16' 8' 0'
1/16" = 1'-0" 64' 32' 16' 8' 0'

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

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TOWN OF SANBORNTON, NH
573 SANBORN RD
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REVISIONS

SHEET TITLE:
DETAILS - BOILER

M3.1

DETAILS - BOILER
M3.1
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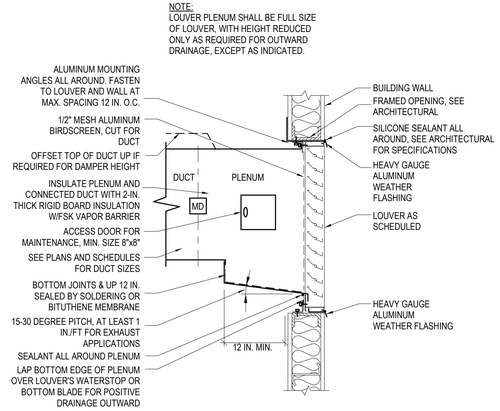
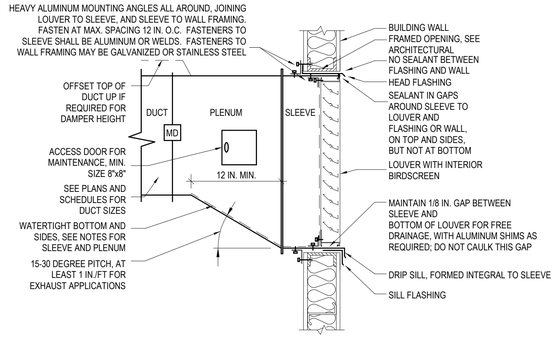


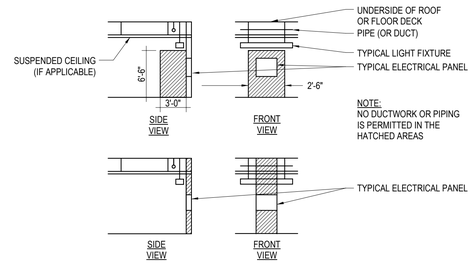
9 M3.2 LOUVER WITH DUCT DETAIL (1)

Scale:N.T.S.



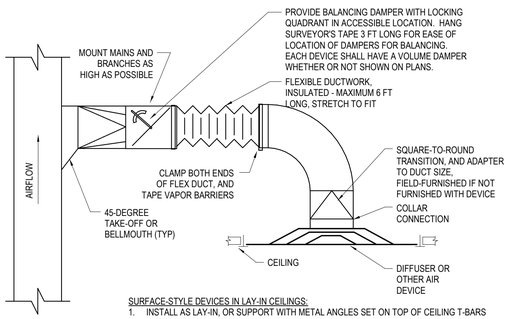
8 M3.2 LOUVER WITH DUCT DETAIL (2)

Scale:N.T.S.



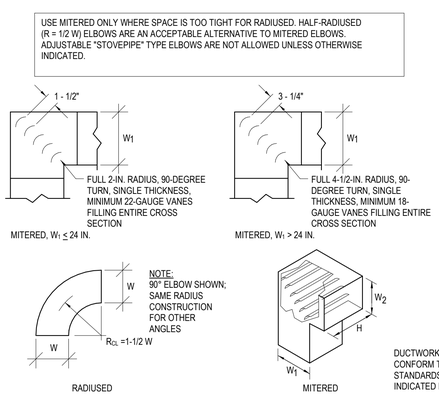
7 M3.2 MIN. CLEARANCES AT ELECTRICAL PANELS

Scale:N.T.S.



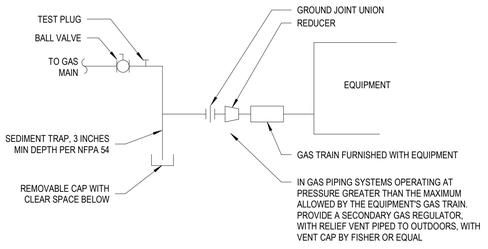
6 M3.2 DUCTWORK RUNOUT TO CEILING AIR DEVICE

Scale:N.T.S.



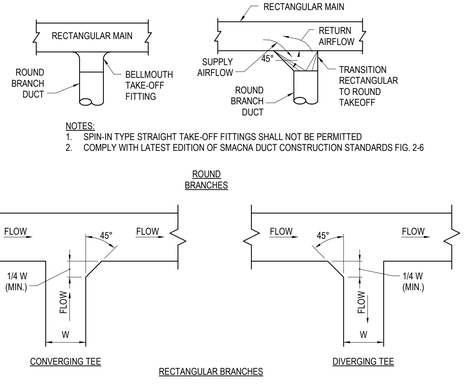
5 M3.2 DUCT ELBOWS

Scale:N.T.S.



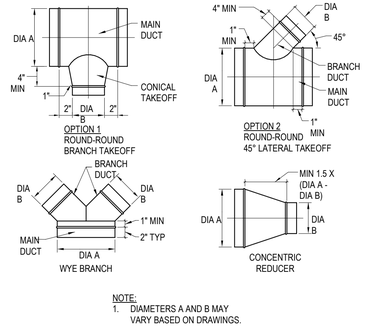
4 M3.2 PROPANE TYPICAL DETAIL

Scale:N.T.S.



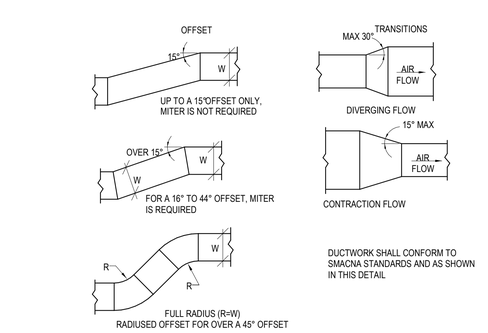
3 M3.2 DUCT TEES TO RECTANGULAR MAINS

Scale:N.T.S.



2 M3.2 TYPICAL ROUND DUCT FITTINGS

Scale:N.T.S.



1 M3.2 DUCTWORK TRANSITIONS

Scale:N.T.S.

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NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

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10/20/2021

PROJ. NO.:	5175
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REVISIONS

SHEET TITLE:

DETAILS

M3.2

DETAILS M3.2

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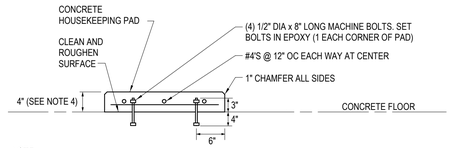
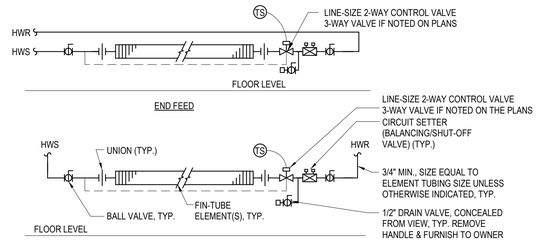


NOTE:
1. HOUSEKEEPING PADS SHALL BE NORMAL WEIGHT PORTLAND CEMENT CONCRETE HAVING A MINIMUM COMPRESSIBLE STRENGTH OF 3000 PSI AT 28 DAYS MEETING ASTM C150 TYPE I OR II. MAXIMUM COURSE AGGREGATE SIZE SHALL BE 3/4". THE WATER-CEMENT RATIO SHALL NOT BE GREATER THAN 0.5; SLUMP SHALL NOT EXCEED 4 IN.
2. ANCHOR BOLTS SHALL MEET ASTM DESIGNATION A307.
3. REINFORCING SHALL BE ASTM A615 GRADE 60.
4. HEIGHT AS DETAILED UNLESS OTHERWISE INDICATED.

5 M3.3 CONCRETE HOUSEKEEPING PAD
Scale:N.T.S.

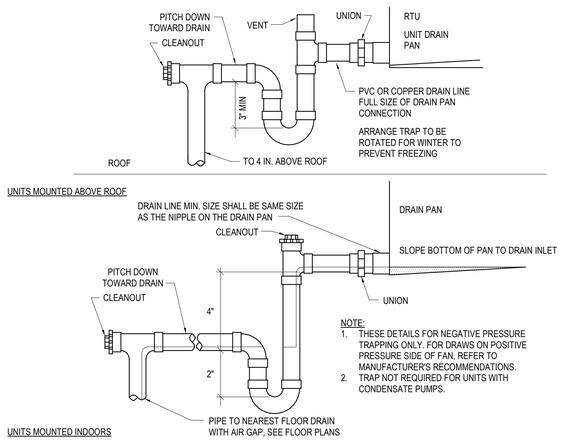


NOTES:
1. BRANCH OFF BOTTOMS OF SUPPLY AND RETURN MAINS, WITH THREE-ELBOW CONNECTIONS
2. FINNED TUBE RADIATION ENCLOSURE NOT SHOWN. FOR LENGTH OF ENCLOSURE REFER TO PIPING PLANS
3. CONTROL VALVES WITHIN ENCLOSURE, OR ABOVE ACCESSIBLE CEILING. ARRANGE SO NO PORTION OF VALVE IS VISIBLE
4. ACVs SHALL HAVE THREADED OR UNION CONNECTIONS. PROVIDE UNION ON AT LEAST ONE SIDE OF 2-WAY VALVES, AT LEAST TWO SIDES OF 3-WAY VALVES
5. PIPE 2-TIER FINTUBE WITH ELEMENTS IN PARALLEL (SUPPLY AT SAME END OF BOTH TIERS) UNLESS OTHERWISE INDICATED
6. RUN RETURN PIPING INSIDE FINTUBE COVER WHERE REQUIRED
7. CONCEAL PIPING DROPS IN PARTITIONS, OR PROVIDE ARCHITECTURAL ENCLOSURES

4 M3.3 FINTUBE AND BASEBOARD PIPING
Scale:N.T.S.

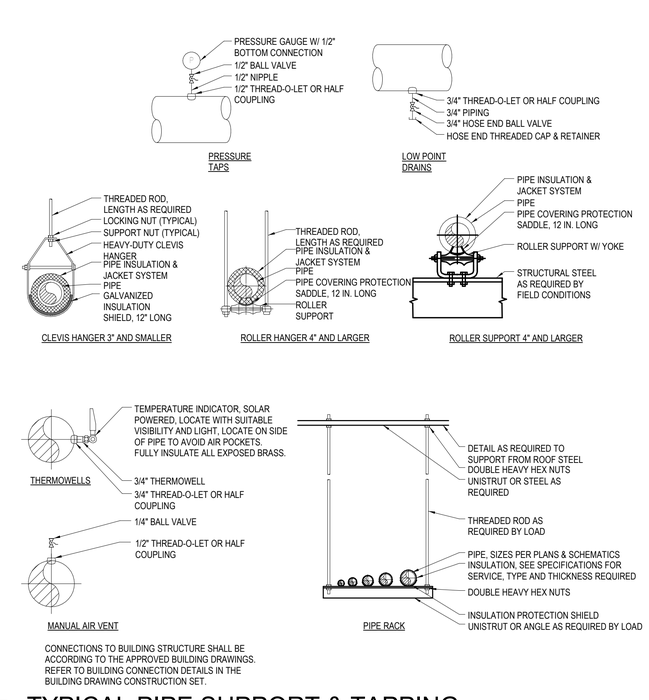
NOTES:
1. REDUCERS SHALL BE ECCENTRIC TYPE
2. VALVES SHALL BE SAME SIZE AS PIPE
3. GAUGES SHALL BE 0-50 PSIG

3 M3.3 IN-LINE PUMP PIPING SCHEMATIC
Scale:N.T.S.



NOTE:
1. THESE DETAILS FOR NEGATIVE PRESSURE TRAPPING ONLY. FOR DRAWS ON POSITIVE PRESSURE SIDE OF FAN, REFER TO MANUFACTURER'S RECOMMENDATIONS.
2. TRAP NOT REQUIRED FOR UNITS WITH CONDENSATE PUMPS.

2 M3.3 CONDENSATE DRAIN TRAPS
Scale:N.T.S.



CONNECTIONS TO BUILDING STRUCTURE SHALL BE ACCORDING TO THE APPROVED BUILDING DRAWINGS. REFER TO BUILDING CONNECTION DETAILS IN THE BUILDING DRAWING CONSTRUCTION SET.

1 M3.3 TYPICAL PIPE SUPPORT & TAPPING
Scale:N.T.S.

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CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE - THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER 10/20/2021

REVISIONS

SHEET TITLE:
DETAILS

M3.3

DETAILS M3.3

1/8" = 1'-0" 0' 4' 8' 16' 32' 64' 4
3/32" = 1'-0" 0' 8' 16' 32' 64' 3
1/16" = 1'-0" 0' 8' 16' 32' 2
1

A B C D E F

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DIAGRAM SYMBOL LEGEND	
DISPLAY	DESCRIPTION
——///——	POWER WIRE
————————	CONTROL WIRE
————————	REF. PIPE

CONT.No		PAGE	

CITY MULTI

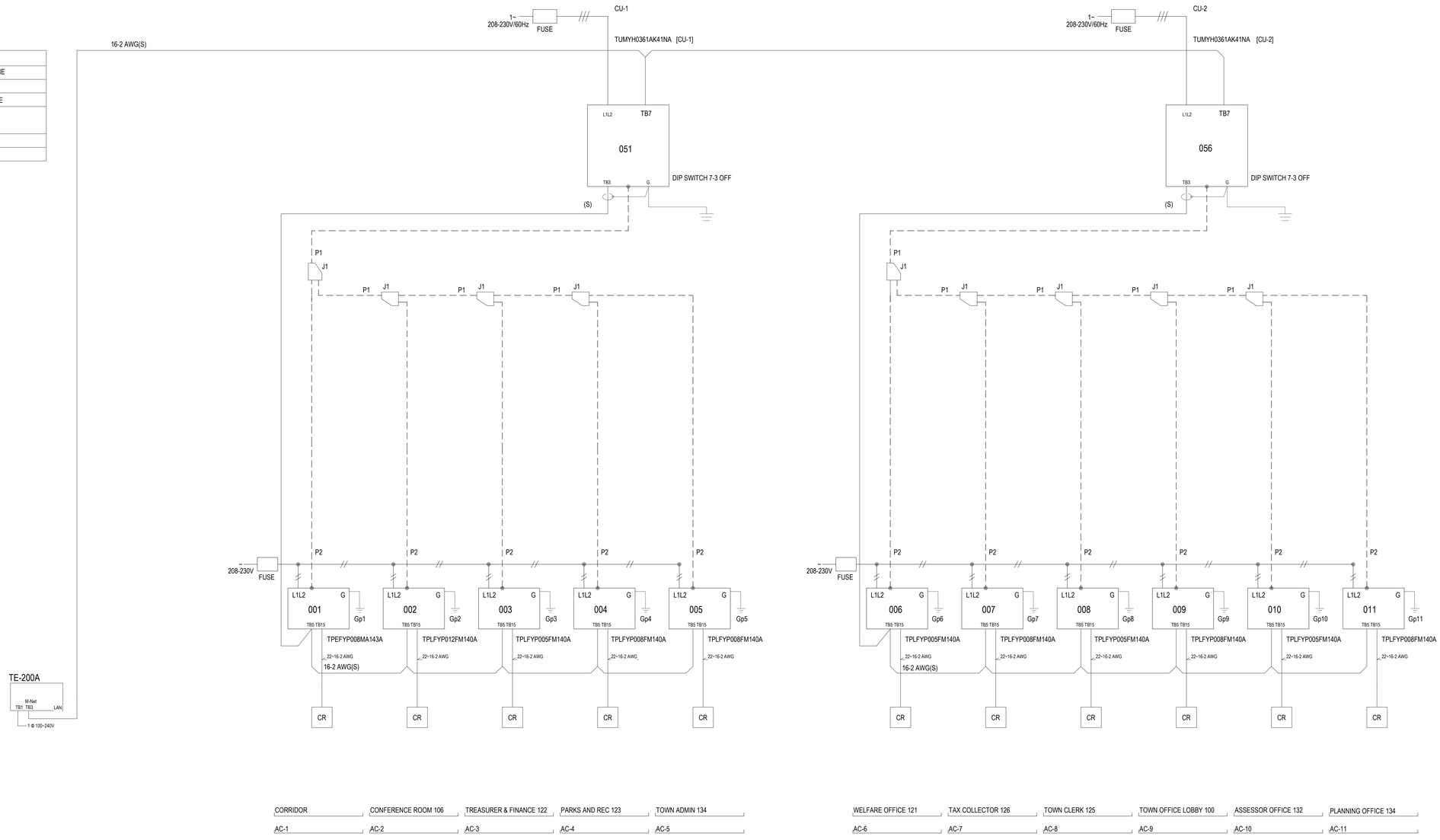
SYSTEM SCHEMATIC DWG.

This drawing is schematic in nature. Final routing of piping & wiring shall be determined by the installing contractor and/or designer of record

Additional refrigerant charge is needed depending on the size and length of extended piping. Please refer the amount of pre-charge and the formula of calculation which is mentioned on the data book.

1.25mm[16 AWG) : 1.25mm[16 AWG) or more. 0.75mm[20 AWG) : between 0.5mm[24 AWG) and 0.75mm[20 AWG).

PIPING AND CONTROLS	
SYMBOL	BRANCH PIPE MODEL NAME
J1	CMY-Y62-G-E
SYMBOL	LIQUID PIPE/GAS PIPE SIZE
P1	3/8 / 5/8
P2	1/4 / 1/2
SYMBOL	MODEL NUMBER
CR	TAC-YT53CRAU-J



1 M3.4 PIPING + CONTROLS DIAGRAM

Scale:N.T.S.

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJR
DRAWN BY:	DTV
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REVISIONS

SHEET TITLE:

DETAILS - VRF

M3.4

DETAILS - VRF

M3.4

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VRF SYSTEM OUTDOOR UNIT SCHEDULE

TAG	SERVES	UNIT TYPE	NOMINAL CAPACITY (TON)	COOLING CAPACITY (BTUH)	HEATING CAPACITY (BTUH)	IEER (NON-DUCTED)	RATED TEMPS		OPERATIONAL RANGE		EFFICIENCIES			REFRIGERANT		SOUND PRESSURE LEVEL dB(A)	UNIT ELECTRICAL						SIZE (W x D x H) (IN.)	WEIGHT (LBS)	MANUFACTURER	MODEL	NOTES
							COOLING (DEG. F DB)	HEATING (DEG. F WB)	COOLING (DEG. F DB)	HEATING (DEG. F WB)	SEER	HSPF	COP (47 DEG. F)	TYPE	FACTORY CHARGE (LB)		VOLTS	PH	HZ	MCA	MOCP	RFS					
CU-1	NORTH	HEAT RECOVERY OUTDOOR UNIT	3	36,000	42,000	13.8	89	-10.5	5-115	-13-59	20.3	11.85	4.08	410A	10	53	230	1	60	36	44	40	42 x 14 x 53	278	TRANE - MITSUBISHI	TUMYH0361AK41NA	1,2,3,4,5,6,7,8,9,10,11,12,13,14
CU-2	SOUTH	HEAT RECOVERY OUTDOOR UNIT	3	36,000	42,000	13.8	89	-10.5	5-115	-13-59	20.3	11.85	4.08	410A	11	53	230	1	60	36	44	40	43 x 14 x 53	278	TRANE - MITSUBISHI	TUMYH0361AK41NA	1,2,3,4,5,6,7,8,9,10,11,12,13,14

GENERAL NOTES:

1. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB)
2. PROVIDE MITSUBISHI MASTER CONTROLER TE-200A. LOCATE WHERE DIRECTED BY OWNER AND ARCHITECT. INTEGRATE ERV'S INTO SYSTEM FOR OCCUPIED UNOCCUPIED CONTROL.
3. EFFICIENCY VALUES FOR EER, IEER, COP ARE BASED ON AHRI 1230 TEST METHOD FOR MIXTURE OF DUCTED & NON-DUCTED INDOOR UNITS.
4. PROVIDE INTERCONNECTING POWER AND CONTROL WIRING IN CONDUIT TO INDOOR VRF UNITS, AND CONTROLS.
5. REFRIGERANT CHARGE FOR BASE UNIT AS SCHEDULED, FIELD-VERIFY.
6. SEE MANUFACTURER'S WRITTEN REQUIREMENTS AND GUIDELINES FOR INSTALLATION REQUIREMENTS
7. PROVIDE GROUND MOUNTING STAND. HEIGHT AT LEAST 24 IN. ABOVE ADJACENT FINISHED SURFACE, SHIMMED LEVEL.
8. BOLT UNITS TO RAILS WITH LARGEST-POSSIBLE DIAMETER HEX-HEAD FASTENER AT EACH FACTORY MOUNTING HOLE.
9. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB)
10. HEAT PUMP SYSTEM PROVIDES EITHER HEATING OR COOLING.
11. FACTORY REPRESENTATIVES SHALL REVIEW THE PROJECT PRIOR TO AND THROUGHOUT THE INSTALLATION OF CITY MULTI EQUIPMENT
12. FACTORY REPRESENTATIVES SHALL STARTUP AND COMMISSION CITY MULTI EQUIPMENT UPON COMPLETION OF EQUIPMENT INSTALLATIONS
13. FACTORY REPRESENTATIVES SHALL PROVIDE END-USER TRAINING ON THE CITY MULTI EQUIPMENT UPON COMPLETION OF THE INSTALLATION OF EQUIPMENT
14. FOR SYSTEMS WITH MULTIPLE MODULES, REFRIGERANT PIPE DIMENSIONS INDICATE TOTAL SYSTEM COMBINED PIPING DOWNSTREAM OF MODULE TWINNING.

VRF INDOOR UNIT SCHEDULE

TAG	SERVES	SYSTEM	UNIT TYPE	COOLING (BTUH)		HEATING (BTUH)	FAN			DRAIN (IN.)	FILTERS		SOUND dB(A)	UNIT ELECTRICAL					DIMENSIONS (W x D x H) (IN.)	WEIGHT (LBS)	MANUFACTURER	MODEL	NOTES
				TOTAL	SENSIBLE		SUPPLY AIRFLOW (CFM)	OUTSIDE AIRFLOW (CFM)	ESP (IN. WG) (SEE NOTE 1)		MERV-A	THICK (IN.)		VOLTS	PH	HZ	MCA	MOCP					
HP-1	PARKS & RECREATION	NORTH	CEILING CASSETTE	7,128	5,881.2	9,000	315	30	-	1 1/4	-	-	29	230	1	60	0.28	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP008FM140A	1,2,3,4,5,6,7,8,9
HP-2	TREASURER & FINANCE	NORTH	CEILING CASSETTE	4,455	4,181.9	5,600	280	30	-	1 1/4	-	-	29	230	1	60	0.24	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP005FM140A	1,2,3,4,5,6,7,8,9
HP-3	CONFERENCE BREAK ROOM PRINTING	NORTH	CEILING CASSETTE	10,692	7,530.2	13,500	335	SEE DRAWING	-	1 1/4	-	-	29	230	1	60	0.29	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP012FM140A	1,2,3,4,5,6,7,8,9
HP-4	WELFARE	NORTH	CEILING CASSETTE	4,520	4,205.6	5,600	280	30	-	1 1/4	-	-	29	230	1	60	0.24	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP005FM140A	1,2,3,4,5,6,7,8,9
HP-5	COORIDOR	NORTH	DUCTED	7,128	6,091.9	9,000	300	35	0.6	1 1/4	-	-	29	230	1	60	1.05	15	28 x 29 x 10	49	TRANE - MITSUBISHI	TPEFYP008MA143A	1,2,3,4,5,6,7,8,9
HP-6	TAX COLLECTOR	SOUTH	CEILING CASSETTE	7,231	5,920.6	9,000	315	30	-	1 1/4	-	-	29	230	1	60	0.28	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP008FM140A	1,2,3,4,5,6,7,8,9
HP-7	TOWN CLERK	SOUTH	CEILING CASSETTE	4,520	4,205.6	5,600	280	30	-	1 1/4	-	-	29	230	1	60	0.24	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP005FM140A	1,2,3,4,5,6,7,8,9
HP-8	TOWN OFFICE LOBBY	SOUTH	DUCTED	7,128	6,091.9	9,000	300	105	0.6	1 1/4	-	-	29	230	1	60	1.05	15	28 x 29 x 10	49	TRANE - MITSUBISHI	TPEFYP008MA143A	1,2,3,4,5,6,7,8,9
HP-9	ASSESSOR	SOUTH	CEILING CASSETTE	4,520	4,205.6	5,600	280	30	-	1 1/4	-	-	29	230	1	60	0.24	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP005FM140A	1,2,3,4,5,6,7,8,9
HP-10	PLANNING OFFICE	SOUTH	CEILING CASSETTE	7,231	5,920.6	9,000	315	30	-	1 1/4	-	-	29	230	1	60	0.28	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP008FM140A	1,2,3,4,5,6,7,8,9
HP-11	TOWN ADMINISTRATOR	NORTH	CEILING CASSETTE	7,128	5,881.2	9,000	315	30	-	1 1/4	-	-	29	230	1	60	0.28	15	23 x 23 x 9	31.3	TRANE - MITSUBISHI	TPLFYP008FM140A	1,2,3,4,5,6,7,8,9

NOTES:

1. NOMINAL COOLING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 80/67°F (DB/WB), OUTDOOR OF 95°F (DB)
2. NOMINAL HEATING CAPACITIES ARE BASED ON INDOOR COIL EAT OF 70°F (DB), OUTDOOR OF 43°F (WB)
3. MITISBUSHI **** SIMPLIFIED WALL CONTROLLER. SINGLE CONTROLLER PER ROOM. INTERFACE TO CONTROL AUXILIARY HEAT (FINTUBE) WHERE AVAILABLE. REFNET BRANCH PIPING KITS FOR PAIRED UNITS ON A SINGLE ROOM ZONE.
4. SEE OUTDOOR UNIT AND BRANCH SELECTOR BOX SCHEDULES FOR ADDITIONAL NOTES.
5. OUTSIDE AIR DUCT CONNECTION.
6. SEE OUTDOOR UNIT SCHEDULE FOR OUTDOOR AMBIENT CONDITIONS, CONNECTED CAPACITY, AND OTHER FACTORS ASSOCIATED WITH CORRECTED CAPACITIES
7. SEE SCHEMATIC PIPING/CONTROL DIAGRAM FOR INDICATION OF REQUIRED INDOOR UNIT REMOTE CONTROLLERS, SYSTEM CONTROLLERS, AND INTEGRATION DEVICES.

ENERGY RECOVER VENTILATOR SCHEDULE

TAG	SERVES	TEMPERATURE EFFECTIVENESS, WINTER (SENSIBLE LOAD REDUCTION)	SYSTEM	AIRFLOW (CFM)	ESP (IN. WG)	FAN SPEED	FAN MOTOR(S)			WINTER PERFORMANCE		SUMMER PERFORMANCE		ELECTRICAL			MANUFACTURER	MODEL	BASE DIMENSIONS LxWxH (IN)	WEIGHT (LBS)	NOTES
							QTY.	KW	AMPS	EAT DB	LAT DB/WB	EAT DB	LAT DB	VOLTS/PH/HZ	MCA (AMPS)	MOCP (AMPS)					
ERV-1	NORTH	70.00%	SUPPLY	225	0.46	MED-HIGH	1	0.155	1.17	0	49	95	88.7	230/1/60	2.05	15	TRANE - MITSUBISHI	TLGHF0300RVX01A	42 x 42 x 14	75	1,2,3,4,5,6
			EXHAUST	225	0.46	MED-HIGH	1	0.155	1.17	70	21	74	80.3								
ERV-2	SOUTH	70.00%	SUPPLY	225	0.46	MED-HIGH	1	0.155	1.17	0	49	95	88.7	230/1/60	2.05	15	TRANE - MITSUBISHI	TLGHF0300RVX01A	43 x 42 x 14	75	1,2,3,4,5,6
			EXHAUST	225	0.46	MED-HIGH	1	0.155	1.17	70	21	74	80.3								

1. PROVIDE WITH DISCONNECT SWITCH.
2. PROVIDE MERV-13 2-INCH THICK PLEATED FILTERS FOR SUPPLY AND MERV-8 2-INCH THICK PLEATED FILTERS FOR EXHAUST.
3. GALVANIZED STEEL CONSTRUCTION, EXTERIOR WHITE PAINTED FINISH, DOUBLE WALL WITH 1" FOAM INJECTED PANELS.
4. PROVIDE SPRING ISOLATORS WITH 1-INCH INITIAL DEFLECTION
5. PROVIDE DISCONNECT SWITCH.
6. PROVIDE WITH 10 YEAR WARRANTY

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TOWN OF SANBORNTON ★ GRANTED 1748 INCORPORATED 1770 ★

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	
DESN. BY:	MJB
DRAWN BY:	DTY
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER – 10/20/2021

REVISIONS

SHEET TITLE:

SCHEDULES

M4.1

SCHEDULES M4.1

1/8" = 1'-0" 3/32" = 1'-0" 1/16" = 1'-0"

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HOT WATER CONDENSING BOILER SCHEDULE

TAG	LOCATION	SERVICE	GAS INPUT (MBH)	OUTPUT (MBH)	RATED FLOW (GPM)	PRESSURE DROP (PSI)	WATER (GAL)	RELIEF VALVE (PSIG)	CONNECTION SIZES (IN.)		ELECTRIC					DIMENSIONS (IN.)			OPERATING WEIGHT (LBS)	MANUFACTURER	LINE	MODEL	NOTES
									COMBUSTION AIR	FLUE GAS	VOLTS	PHASE	HERTZ	FLA (AMP)	MOP (AMP)	HEIGHT	WIDTH	DEPTH					
B-1	MECHANICAL ROOM	HEATING WATER	80	74	7.6	7.5	-	50	2	2	120	1	60	2.8	6.3	38	25	19.5	130	LAARS	NEOTHERM	NT 080	1,2,3,4,5,6,7,8

NOTES:
1. GAS FUEL: PROPANE, 7 TO 14 IN. WC INLET PRESSURE, 5 TO 1 TURNDOWN.
2. BOILER SHALL COME WITH BOILER PUMP TO BE FIELD MOUNTED AND WIRED TO SINGLE POINT POWER CONNECTION. BOILER SHALL BE CONNECTED TO A PRIMARY SECONDARY SYSTEM.
3. TEMPERATURES: 40 DEG. F MIN., 194 DEG. F MAX.
4. PROVIDE LARGE LCD DISPLAY WITH TOUCHPAD INTERFACE INCLUDING QUICK START MENU OPTIONS.
5. SAFETIES SHALL INCLUDE LOW-WATER CUTOFF FOR EACH BOILER, AND HIGH GAS PRESSURE CUTOFF SWITCH.
6. VENTING: 2" CPVC COMPLYING WITH ANSI/ASTM D1785 F441 SUITABLE FOR CONDENSING BOILERS.
7. CONDENSATE: PROVIDE NEUTRALIZATION KIT & MEDIA. DRAIN THE HEAT EXCHANGER AND THE EXHAUST VENT. PIPE USING MANUFACTURER-APPROVED MATERIALS TO FLOOR DRAIN.
8. PROVIDE SYSTEM FILL WATER CONFORMING TO MANUFACTURER'S WATER CHEMISTRY REQUIREMENTS. PROVIDE WATER TREATMENT AS SPECIFIED.

HVAC PUMP SCHEDULE

TAG	LOCATION	SERVICE	TYPE	DESIGN PUMP DATA			FLANGED CONNECTIONS (IN.)	MOTOR		ELECTRIC				WEIGHT (LB)	MANUFACTURER	MODEL	NOTES
				CAPACITY (GPM)	HEAD (FT. WG)	FLUID		WATTS	RPM	VOLTS	PH	HZ	AMPS				
HWP-1	BOILER RM	HEATING WATER	VERTICAL INLINE	7	20	WATER	1 1/4	170	830-4300	115	1	60	1.48	10.5	TACO	0034e-F2	1,2
HWP-2	BOILER RM	HEATING WATER	VERTICAL INLINE	7	20	WATER	1 1/4	170	830-4300	115	1	60	1.48	10.5	TACO	0034e-F2	1,2

NOTES:
1. CAST IRON CASING, WITH COMPOSITE IMPELLER, CERAMIC SHAFT. 150 PSI RATED WORKING PRESSURE, 230 DEG. F MAXIMUM WORKING TEMPERATURE.
2. PUMP SHALL HAVE AN ECM MOTOR WITH FIVE VARIABLE SPEED PERFORMANCE CURVES INCLUDING ACTIVEADAPT MODE.

FINTUBE RADIATION SCHEDULE

TAG	CAPACITY (BTUH/LF)	RATED FLOW (GPM)	AVG. WATER TEMP (DEG. F)	NUMBER TIERS	ELEMENT						ENCLOSURE						MANUFACTURER	NOTES
					MODEL	TUBE MAT'L	TUBE SIZE (IN.)	FIN SIZE (IN.)	FPF	FIN THICK (IN.)	STYLE	TYPE	FRONT GAUGE	DEPTH (IN.)	HEIGHT (IN.)	INSTALLED HEIGHT (IN.)		
FR-1	530	1.5	150	1	RO2	COPPER	3/4	2.75 x 3.75	50	0.011	LCS-10	SLOPED	18	3.25	10.25	14.2	STERLING	1,2,3,4

GENERAL NOTES:
1. RATINGS AT WATER VELOCITY SCHEDULED. SEE FLOOR PLAN FOR FLOW RATE (GPM) FOR EACH SETTING OF FINTUBE.
2. SCHEDULED-GAUGE FRONT PANELS, BACKPLATES. PROVIDE END CAPS, WALL SLEEVES, INSIDE AND OUTSIDE CORNERS, AND VALVE COMPARTMENTS. PROVIDE ACCESS COVERS AT VALVES AND VENTS.
3. ELEMENTS OF COPPER TUBES EXPANDED INTO ALUMINUM FINS.
4. COLOR SELECTED BY ARCHITECT FROM MANUFACTURER'S STANDARD COLOR CHART.

EXPANSION TANK SCHEDULE

TAG	SERVICE	VOLUME (GAL)	ACCEPTANCE (GAL)	RATED TEMP. (DEG. F)	RATED PRESSURE (PSIG)	CONNECTION SIZE (IN.)	SIZE (IN.)		MANUFACTURER	MODEL	NOTES
							DIAMETER	HEIGHT			
ET-1	HEATING	10.9	2.4	240	125	1/2	12	27	AMTROL	AC-20V	1,3,4

GENERAL NOTES:
1. BLADDER TYPE, ASME SECTION VIII CONSTRUCTION AND LABEL. PLUG DRAIN PORTS ON AIR SIDE TO AVOID AIR LOSS.
2. FULL ACCEPTANCE.
3. PRECHARGE PRESSURE: 12 PSIG (SYSTEM COLD FILL PRESSURE).
4. CHARGE TO PRECHARGE PRESSURE AND TEST FOR LEAKAGE BEFORE INSTALLING.

AIR & DIRT SEPARATOR SCHEDULE

TAG	SERVICE	FLOW RATE (GPM)	OPTIMUM FLOW (GPM)	OPTIMUM VELOCITY (FPM)	CONNECTIONS		SIZE			RATED PRESSURE (PSIG)	RATED TEMP. (DEG. F)	MANUFACTURER	MODEL	NOTES
					FLANGE (IN.)	NPT (IN.)	DIAMETER (IN.)	LENGTH (IN.)	HEIGHT (IN.)					
AS-1	HEATING	-	15	6	-	1-1/4	2.6	3.5	7 4/5	150	270	SPIROVENT	VJR-125TM	1, 2

NOTES:
1. INTEGRAL AUTOMATIC AIR VENT WITH INTEGRAL SHUT-OFF VALVE THREADED DRAIN PLUG TYPE OUTLET, DRAIN PORT
2. BRASS BODY WITH PRIME PAINT FINISH

SUPPLY DIFFUSER & GRILLE SCHEDULE

TAG	NECK SIZE (IN.)	FRAME SIZE (IN.)	AIRFLOW (CFM)	THROW (FT)	SOUND (NC)	SP (IN. WG)	PATTERN	TYPE	FRAME	MANUFACTURER	MODEL	NOTES
S-1	6 DIA.	24x24	175	4.5	<20	0.04	4 - WAY	CEILING DIFFUSER	SQUARE LAY-IN	PRICE	SDC	1,4,8
S-2	-	12x6	300	15	<20	0.04	DOUBLE DEFLECTION	HORIZONTAL DIFFUSER	SURFACE	PRICE	520L	2,9

NOTES:	GENERAL NOTES:
1. FOR INSTALLATION IN 24x24 EXPOSED TEE CEILING	1. PROVIDE WITH WHITE STANDARD FINISH
2. INSTALL AS LAY-IN, OR SURFACE MOUNT WITH SUPPORT	2. SEE PLANS FOR MULTIPLE UNIT LOCATIONS
3. SQUARE-TO-ROUND ADAPTER TO AVAILABLE SIZE NEAREST TO DUCT SIZE	3. AIRFLOW SCHEDULED IS FOR RATED PERFORMANCE. BALANCING CFM IS INDICATED ON PLANS.
4. THROWS RATED AT 75 FPM TERMINAL VELOCITY	4. SQUARE-NECK CEILING DIFFUSERS: 4-WAY PATTERN SCHEDULED; PROVIDE CORE PATTERNS AS INDICATED ON PLANS.
5. THROWS RATED AT 200-100 FPM TERMINAL VELOCITY	4. CONTRACTOR SHALL PROVIDE ANY TRANSITIONS REQUIRED TO DUCT SIZE
6. THROWS RATED AT 100 FPM TERMINAL VELOCITY	5. BALANCING AGENT SHALL SET DISCHARGE VANES TO REQUIRED PATTERN FOR COMFORTABLE AIRFLOW
7. PLAQUE FACE. ADJUST THERMAL DIFFUSER SETPOINTS - 70°F HEATING, 75°F COOLING.	6. CONTRACTOR SHALL PROVIDE ANY TRANSITIONS REQUIRED TO DUCT SIZE
8. INSTALL WITH FLEXIBLE CONNECTION	
9. DOUBLE-DEFLECTION, HORIZONTAL FRONT VANES	

VENT CAP AND LOUVER SCHEDULE

TAG	LOCATION	SERVES	AIRFLOW (CFM)	TYPE	WIDTH (IN.)	HEIGHT (IN.)	DEPTH (IN.)	FREE AREA (SQ. FT)	VELOCITY (FPM)	SP (IN. WC)	BLADE ANGLE (DEG)	MANUFACTURER	MODEL	NOTES
L-1	EAST WALL	EXHAUST	300	CHANNEL	13	15	4	0.44	638	0.06	-	GREENHECK	ESD-403	1,2,3,4
L-2	EAST WALL	EXHAUST	300	CHANNEL	13	15	4	0.44	638	0.06	-	GREENHECK	ESD-403	1,2,3,4
L-3	CUPOLA	INTAKE	600	CHANNEL	28	20	4	1.46	397	0.03	-	GREENHECK	ESD-403	1,2,3,4

NOTES:
1. SHALL BE MADE OF EXTRUDED ALUMINUM WITH 2-COAT 70% KYNAR FINISH ON EQUIPMENT AND ACCESSORIES IN THE AIRSTREAM. COLOR SELECTED BY ARCHITECT.
2. AIRFLOW INDICATED IS FOR RATING. VERIFY BALANCING AIRFLOW BASED ON CONNECTED EQUIPMENT AND AS NOTED ON PLANS.
3. MOTORIZED DAMPER: MOTORIZED DAMPER MODEL VCD-23 WITH 24 VOLT BELEMO ACTUATOR. SIZE SO PLENUM DRAINS OVER LOUVER WATERSTOP OR BOTTOM BLADE.
4. FIELD-VERIFY SIZES BEFORE ORDERING.

RETURN, EXHAUST & TRANSFER GRILLE SCHEDULE

TAG	NECK SIZE (IN.)	FRAME SIZE (IN.)	AIRFLOW (CFM)	SP (IN. WG)	SOUND (NC)	TYPE	DUCT COLLAR INCLUDED	FRAME	MANUFACTURER	MODEL	NOTES
R-1	8x8	24x24	130	0.02	-	CEILING GRILLE	NO	SQUARE LAY-IN	PRICE	80SR	1,2,3,4
R-2, T-2	12x12	24x24	320	0.02	-	CEILING GRILLE	NO	SQUARE LAY-IN	PRICE	80SR	1,2,3,4
R-3	-	8x8	150	0.02		SIDEWALL	NO	SURFACE	PRICE	510Z	1,3,4

NOTES:	GENERAL NOTES:
1. INSTALL AS LAY-IN, OR SURFACE MOUNT WITH SUPPORT	1. PROVIDE WITH WHITE STANDARD FINISH
2. FOR INSTALLATION IN 24x24 EXPOSED TEE CEILING	2. SEE PLANS FOR MULTIPLE UNIT LOCATIONS.
3. CONTRACTOR SHALL PROVIDE SQUARE-TO-ROUND TRANSITION	3. AIRFLOW SCHEDULED IS FOR RATED PERFORMANCE. BALANCING CFM IS INDICATED ON...
4. INSTALL WITH FLEXIBLE CONNECTION	4. CONTRACTOR SHALL PROVIDE ANY TRANSITIONS REQUIRED TO DUCT SIZE

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TOWN OF SANBORNTON ★ GRANTED 1748 INCORPORATED 1770 ★

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	
DESN. BY:	MJB
DRAWN BY:	DTY
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE - THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER 10/20/2021

REVISIONS

SHEET TITLE:
SCHEDULES

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SCHEDULES
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1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

SECTION 230500 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PROVIDE LABOR, MATERIALS, ACCESSORIES, AND OTHER RELATED ITEMS AS REQUIRED TO COMPLETE OPERATIONS IN CONNECTION WITH THE COMPLETE INSTALLATION OF THE HVAC AND MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN.

1.2 RELATED REQUIREMENTS

A. CONDITIONS OF THE CONTRACT APPLY TO THE WORK, INCLUDING THE WORK OF THIS DIVISION. EXAMINE CONTRACT DOCUMENTS FOR REQUIREMENTS AFFECTING THE WORK.

B. PROVIDE COOPERATION WITH, AND ASSISTANCE TO, THE TESTING AND BALANCING (TAB) AGENT SPECIFIED IN DIVISION 23 SECTION "TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS."

1.3 DRAWINGS

A. THE GENERAL LOCATION OF THE APPARATUS AND THE DETAILS OF THE WORK ARE INDICATED ON THE DRAWINGS. EXACT LOCATIONS NOT INDICATED SHALL BE DETERMINED AT THE SITE AS THE WORK PROGRESSES AND SHALL BE SUBJECT TO THE ARCHITECT'S APPROVAL.

B. IT IS NOT INTENDED THAT THE DRAWINGS SHALL SHOW EVERY PIPE, PIPE RISE, PIPE DROP, DUCT RISE, DUCT DROP, PIPE FITTING, DUCT FITTING, OR APPLIANCE, BUT IT SHALL BE A REQUIREMENT TO FURNISH, WITHOUT ADDITIONAL EXPENSE, MATERIAL AND LABOR NECESSARY TO COMPLETE THE SYSTEMS IN ACCORDANCE WITH THE DESIGN INTENT AND WITH THE HIGHEST POSSIBLE QUALITY AVAILABLE.

1.4 ALTERATIONS

A. EXECUTE ALTERATIONS, ADDITIONS, REMOVALS, RELOCATIONS, NEW WORK, AND OTHER RELATED ITEMS AS INDICATED OR REQUIRED TO PROVIDE A COMPLETE INSTALLATION IN ACCORDANCE WITH THE INTENT OF THE CONTRACT DOCUMENTS, INCLUDING CHANGES REQUIRED BY BUILDING ALTERATIONS.

1.5 REQUIREMENTS

A. INSTALLATION INSTRUCTIONS: OBTAIN MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS TO AID IN PROPERLY EXECUTING WORK ON MAJOR PIECES OF EQUIPMENT. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

B. OBJECTIONABLE NOISE, FUMES AND VIBRATION:

1. MECHANICAL AND ELECTRICAL EQUIPMENT SHALL OPERATE WITHOUT CREATING OBJECTIONABLE NOISE, FUMES, OR VIBRATION, AS DETERMINED BY THE ARCHITECT.
2. IF SUCH OBJECTIONABLE NOISE, FUMES, OR VIBRATION IS PRODUCED AND TRANSMITTED TO OCCUPIED PORTIONS OF BUILDING BY APPARATUS, PIPING, DUCTS, OR ANY OTHER PART OF MECHANICAL AND ELECTRICAL WORK, MAKE NECESSARY CHANGES AND ADDITIONS, AS APPROVED, WITHOUT EXTRA COST TO OWNER.

C. EQUIPMENT DESIGN AND INSTALLATION:

1. UNIFORMITY: UNLESS OTHERWISE SPECIFIED, EQUIPMENT OR MATERIAL OF SAME TYPE OR CLASSIFICATION, USED FOR SAME PURPOSES, SHALL BE PRODUCT OF SAME MANUFACTURER.
2. DESIGN: EQUIPMENT AND ACCESSORIES NOT SPECIFICALLY DESCRIBED OR IDENTIFIED BY MANUFACTURER'S CATALOG NUMBER SHALL BE DESIGNED IN CONFORMITY WITH ASME, IEEE, OR OTHER APPLICABLE TECHNICAL STANDARDS, SUITABLE FOR MAXIMUM WORKING PRESSURE, AND WITH NEAT AND FINISHED APPEARANCE.
3. INSTALLATION: ERECT EQUIPMENT ALIGNED, LEVEL AND ADJUSTED FOR SATISFACTORY OPERATION. INSTALL SO THAT CONNECTING AND DISCONNECTING OF PIPING AND ACCESSORIES CAN BE MADE READILY, AND SO THAT PARTS ARE EASILY ACCESSIBLE FOR INSPECTION, OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM INDICATED ARRANGEMENTS MAY BE MADE, AS APPROVED.

D. PROTECTION OF EQUIPMENT AND MATERIALS: RESPONSIBILITY FOR CARE AND PROTECTION OF MATERIALS AND MECHANICAL WORK RESTS WITH THE CONTRACTOR UNTIL THE ENTIRE PROJECT HAS BEEN COMPLETED, TESTED AND THE PROJECT IS ACCEPTED BY THE OWNER.

E. FOUNDATIONS:

1. WHERE FLOOR MOUNTING IS INDICATED, LOCATE EQUIPMENT ON 4 INCH HIGH REINFORCED CONCRETE PAD OF ADEQUATE SIZE WITH ANCHORS AND BASE PLATES AS REQUIRED, ON PRESSURE-TREATED SLEEPERS, OR ON STRUCTURAL STEEL FRAME AS DETAILED. THE CORNERS OF PADS SHALL BE CHAMFERED 1 INCH. PAD AND STEEL SIZES AND LOCATION SHALL BE COORDINATED WITH THE APPROVED EQUIPMENT.

1.6 ACCESS PANELS

A. ACCESS PANELS REQUIRED FOR ITEMS FURNISHED UNDER DIVISION 23 SHALL BE PROVIDED UNDER THIS DIVISION.

B. MANUFACTURER, AND MODEL OF STANDARD DOORS: J. L. INDUSTRIES, INC., MODEL WB; KARP ASSOCIATES, INC., MODEL KDW; OR THE WILLIAMS BROTHERS CORPORATION OF AMERICA, MODEL WB-DW.

C. ACCESS PANELS SHALL BE STANDARD PANELS, 12 INCH X 16 INCH (305 MM X 406 MM) MINIMUM UNLESS INDICATED OTHERWISE. PANELS INSTALLED IN AREAS OF HIGH MOISTURE CONCENTRATION, SUCH AS LOCKER ROOMS, NEAR PLUMBING FIXTURES, FOOD PREPARATION AREAS, OR OUTDOORS, SHALL BE FABRICATED OF PAINTABLE STAINLESS STEEL OR ALUMINUM FOR CORROSION RESISTANCE.

D. DOORS AND FRAMES SHALL BE FACTORY PRIMED. LATCHES SHALL BE OPERATED BY TUMBLER LOCK, KEYED ALIKE, FURNISH 3 KEYS TO THE OWNER.

E. PROVIDE ACCESS PANELS IN BUILDING CONSTRUCTION WHERE REQUIRED FOR ACCESS TO DUCT ACCESS DOORS OR OTHER COMPONENTS SUCH AS VALVES, AIR VENTS, ACTUATORS, VOLUME DAMPERS, MOTORIZED DAMPERS IN DUCTWORK, DUCT SMOKE DETECTORS, AND OTHER RELATED ITEMS.

1.7 ELECTRIC WORK

A. PROVIDE MOTORS, PILOT LIGHTS, CONTROLLERS, LIMIT SWITCHES, AND OTHER RELATED ITEMS FOR EQUIPMENT PROVIDED UNDER DIVISION 23.

B. EXCEPT AS NOTED, REQUIRED LINE SWITCHES, FUSED SWITCHES, AND OTHER RELATED ITEMS AND NECESSARY WIRING TO PROPERLY CONNECT EQUIPMENT TO MOTORS AND SWITCHES SHALL BE FURNISHED AND INSTALLED UNDER DIVISION 26, ELECTRIC.

C. PROVIDE COMPLETE WIRING SYSTEM FOR AUTOMATIC TEMPERATURE CONTROLS AS SPECIFIED UNDER SECTION DIVISION 23 SECTION "INSTRUMENTATION AND CONTROLS FOR MECHANICAL SYSTEMS."

D. WIRING SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE.

1.8 SUBMITTALS

A. AFTER AWARD OF CONTRACT AND BEFORE INSTALLATION, SUBMIT FOR APPROVAL SHOP DRAWINGS, BULLETINS, PRODUCT DATA, SAMPLES, AND OTHER RELATED ITEMS.

B. SUBMIT SHOP DRAWINGS AND PRODUCT DATA AS REQUIRED IN EACH SECTION. SUBMITTAL SHALL INCLUDE PHYSICAL DATA AND PERFORMANCE DATA REQUIRED TO VERIFY COMPLIANCE WITH THE CONTRACT DOCUMENTS.

C. ARCHITECT/ENGINEER'S REVIEW WILL NOT INCLUDE THE REVIEW, COORDINATION, OR VERIFICATION OF DIMENSIONS OR QUANTITIES; THESE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

1.9 SUBSTITUTIONS

A. COMPLY WITH PROVISIONS OF THE INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS.

B. THE FIRST ITEM LISTED UNDER "ACCEPTABLE MANUFACTURERS", "APPROVED MANUFACTURERS" OR "MANUFACTURERS" IS THE DESIGN BASIS.

1. OTHER MANUFACTURERS LISTED MAY BE USED IN THE BASE BID, BUT CONFORMANCE WITH DETAILS OF THE SPECIFICATIONS, AS WELL AS DIMENSIONAL AND ELECTRICAL DATA, SHALL BE VERIFIED BY THE CONTRACTOR.
   ARCHITECT/ENGINEER HAS NOT VERIFIED THAT EACH LISTED MANUFACTURER HAS THE ABILITY TO PROVIDE AN ACCEPTABLE SUBSTITUTION FOR THE BASIS-OF-DESIGN PRODUCT. CONTRACTOR MAY NOT ASSUME THAT SUBSTITUTIONS WILL BE APPROVED.
2. MODIFICATIONS REQUIRED AS A RESULT OF DIFFERENCES BETWEEN THE DESIGN BASIS ITEM AND THE SUBMITTED AND APPROVED ITEM MUST BE APPROVED BY THE ARCHITECT AND MADE AT THE CONTRACTOR'S EXPENSE. AS AN EXAMPLE, IF A ROOFTOP HVAC UNIT IS SUBMITTED AND APPROVED AND IF THE UNIT'S DIMENSIONS AND WEIGHT ARE DIFFERENT FROM THOSE OF THE UNIT WHICH WAS USED AS THE DESIGN BASIS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR BUILDING STRUCTURAL MODIFICATIONS REQUIRED TO ACCOMMODATE THE SUBMITTED AND APPROVED UNIT, AT NO ADDITIONAL COST TO THE OWNER.
3. WHEN, IN THE ARCHITECT OR ENGINEER'S OPINION, ARCHITECTURAL OR ENGINEERING SERVICES ARE NECESSARY FOR THE COORDINATION OF SUBSTITUTED ITEMS, THE CONTRACTOR SHALL REIMBURSE THE OWNER FOR THE COST OF THESE SERVICES.
4. FOR ITEMS WHICH HAVE NO MANUFACTURERS LISTED, ANY ITEM CONFORMING WITH THE CONTRACT DOCUMENTS IS ACCEPTABLE.

C. SUBSTITUTIONS FROM MANUFACTURERS OR PROVIDERS WHICH ARE NOT LISTED MAY BE PROPOSED WITHIN THE TIME ALLOWED IN THE GENERAL CONDITIONS OF THE SPECIFICATIONS.

1. THE EXCEPTION TO THIS IS PRODUCTS FOR WHICH THE LIST OF MANUFACTURERS OR PROVIDERS IS LIMITED BY THE WORDING "NO SUBSTITUTIONS" OR SIMILAR WORDING.

1.10 COORDINATION

A. COORDINATE SCHEDULING, SUBMITTALS, AND WORK OF THE VARIOUS SECTIONS OF SPECIFICATIONS TO ASSURE EFFICIENT AND ORDERLY SEQUENCE OF INSTALLATION OF INTERDEPENDENT CONSTRUCTION ELEMENTS, WITH PROVISIONS FOR ACCOMMODATING ITEMS INSTALLED LATER.

B. COORDINATE SPACE REQUIREMENTS AND INSTALLATION OF MECHANICAL AND ELECTRICAL WORK WHICH ARE INDICATED DIAGRAMMATICALLY ON DRAWINGS. FOLLOW ROUTING SHOWN FOR PIPES, DUCTS, AND CONDUIT, AS CLOSELY AS PRACTICABLE; PLACE RUNS PARALLEL WITH LINE OF BUILDING. UTILIZE SPACES EFFICIENTLY TO MAXIMIZE ACCESSIBILITY FOR OTHER INSTALLATIONS, FOR MAINTENANCE, AND FOR REPAIRS.

C. IN FINISHED AREAS, CONCEAL PIPES, DUCTS, AND WIRING WITHIN THE CONSTRUCTION. COORDINATE LOCATIONS OF FIXTURES AND OUTLETS WITH FINISH ELEMENTS.

D. COORDINATE COMPLETION AND CLEAN-UP OF WORK OF SEPARATE SECTIONS IN PREPARATION FOR SUBSTANTIAL COMPLETION.

E. AFTER OWNER OCCUPANCY OF PREMISES, COORDINATE ACCESS TO SITE FOR CORRECTION OF DEFECTIVE WORK AND WORK NOT IN ACCORDANCE WITH CONTRACT DOCUMENTS, TO MINIMIZE DISRUPTION OF OWNER'S ACTIVITIES.

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1.11 COORDINATION DRAWINGS

A. AS A REQUIREMENT OF THIS SPECIFICATION, THE CONTRACTOR SHALL PARTICIPATE IN THE DEVELOPMENT OF A SET OF COMMON COORDINATION DRAWINGS FOR THE PROJECT.

B. THE HVAC MECHANICAL SUBCONTRACTOR SHALL BE RESPONSIBLE TO MANAGE THE COORDINATION DRAWING EFFORT AND SUBMIT THE DRAWINGS AS SHOP DRAWINGS FOR REVIEW AND COMMENT. THE HVAC MECHANICAL SUBCONTRACTOR SHALL DEVELOP THE BASE FLOOR PLANS AND BUILDING SECTIONS AND PLACE HIS MECHANICAL EQUIPMENT DUCTWORK AND PIPING ON THEM. HE SHALL THEN COORDINATE AND MANAGE EACH TRADE'S EFFORT WHILE THEY PLACE THEIR INFORMATION ON THE SAME DRAWINGS.

C. EACH TRADE: PLUMBING, AND ELECTRICAL SHALL WORK WITH THE HVAC MECHANICAL SUBCONTRACTOR TO HELP PRODUCE THE COORDINATION DRAWINGS. EACH TRADE SHALL BE RESPONSIBLE TO COORDINATE THEIR OWN EQUIPMENT, PIPING, CONDUIT, TRAY AND OTHER ASSOCIATED MATERIALS WITH THE OTHER TRADES AND PLACE THIS INFORMATION ON THE DRAWINGS.

D. THE COORDINATION DRAWINGS MAY BE CAD OR HAND DRAFTED AS SELECTED BY THE HVAC MECHANICAL SUBCONTRACTOR. FLOOR PLANS SHALL BE PREPARED AT A MINIMUM SCALE OF 1/4 INCH = 1 FT. SECTIONS THROUGH THE ENTIRE BUILDING SHALL BE PREPARED AT A MINIMUM SCALE OF 1/4 INCH = 1 FT. DETAIL SECTIONS ACROSS CORRIDORS OR OTHER SMALL AREAS SHALL BE PREPARED AT A MINIMUM SCALE OF 1 INCH = 1 FT.

E. PREPARE COORDINATION DRAWINGS FOR BOTH EXISTING AND NEW AREAS OF THE FACILITY. THE DRAWING DETAIL SHALL BE SUFFICIENT TO ENSURE COORDINATION BETWEEN THE TRADES AND ALSO WITH THE BUILDING STRUCTURE. AS A MINIMUM THE FOLLOWING SHALL BE SHOWN IN PLAN AND SECTION:

1. BUILDING STRUCTURE.
2. MAJOR EQUIPMENT.
3. CEILING-MOUNTED EQUIPMENT IN CEILING GRID, SUCH AS LIGHTING FIXTURES, HVAC DIFFUSERS, AND SPRINKLERS.
4. CEILINGS IN ELEVATION
5. DUCT WORK
6. MAJOR DUCT, PIPE, CONDUIT AND TRAY RUNS
7. WORK IN CORRIDORS
8. SINGLE PIPE AND CONDUITS RUN OUTSIDE OF CORRIDOR AREAS WHEN GREATER THAN 1-1/2 INCH (38 MM) IN NOMINAL DIAMETER.

F. MECHANICAL HVAC, PLUMBING, AND ELECTRICAL CONSTRUCTION SHALL NOT COMMENCE UNTIL COORDINATION DRAWINGS HAVE BEEN REVIEWED. THE CONTRACTOR SHALL BRING ANY COORDINATION ISSUES TO THE ATTENTION OF THE ARCHITECT. REVIEW OF THE COORDINATION DRAWINGS BY THE ARCHITECT DOES NOT RELIEVE THE CONTRACTOR OF HIS/HER RESPONSIBILITY TO PROVIDE A PROPERLY COORDINATED CONSTRUCTION PROJECT.

1.12 REQUESTS FOR ARCHITECT'S CADD DRAWINGS

A. IN LIEU OF GENERATING THEIR OWN CADD DRAWINGS, THE CONTRACTOR MAY ELECT TO USE THE ARCHITECT'S ELECTRONIC COPIES OF CADD DRAWINGS FOR THE PURPOSE OF DEVELOPING COORDINATION DRAWINGS, DEVELOPING CONTROL SYSTEM GRAPHICS OR FOR OTHER REASONS THAT PERTAIN TO THE REQUIREMENTS OF THIS CONTRACT. IF THE CONTRACTOR ELECTS TO UTILIZE THE ARCHITECT'S ELECTRONIC COPIES OF CADD DRAWINGS, THE ELECTRONIC FILES SHALL BE PURCHASED FROM THE ARCHITECT AT THE ARCHITECT'S CURRENT BILLING RATE PER DRAWING. THE CONTRACTOR SHALL PROVIDE PAYMENT AND SHALL SIGN A RELEASE-OF-LIABILITY FORM BEFORE ELECTRONIC CADD DRAWINGS ARE RELEASED.

1.13 CLEANING

A. REMOVE DEBRIS FROM SITE DAILY.

B. MATERIAL AND PIECES OF EQUIPMENT SHALL BE TURNED OVER TO THE OWNER FREE OF DUST AND DIRT, BOTH INSIDE AND OUT.

C. AT THE COMPLETION OF THE PROJECT, EQUIPMENT SHALL HAVE A CLEAN, NEAT APPEARANCE OF FACTORY FINISH BY CLEANING OR REPAINTING AS REQUIRED.

D. AT THE COMPLETION OF THE PROJECT, SURFACES EXPOSED TO VIEW SHALL HAVE A CLEAN, NEAT APPEARANCE OF FINISH FREE FROM SMUDGES AND SCRATCHES BY CLEANING OR REPAINTING AS REQUIRED.

1.14 STARTING SYSTEMS

A. COORDINATE SCHEDULE FOR START-UP OF VARIOUS EQUIPMENT AND SYSTEMS.

B. NOTIFY ARCHITECT/ENGINEER 7 DAYS PRIOR TO START-UP OF EACH ITEM.

C. VERIFY THAT EACH PIECE OF EQUIPMENT OR SYSTEM HAS BEEN CHECKED FOR PROPER LUBRICATION, DRIVE ROTATION, BELT TENSION, CONTROL SEQUENCE, OR OTHER CONDITIONS WHICH MAY CAUSE DAMAGE.

D. VERIFY THAT TESTS, METER READINGS, AND SPECIFIED ELECTRICAL CHARACTERISTICS AGREE WITH THOSE REQUIRED BY THE EQUIPMENT OR SYSTEM MANUFACTURER.

E. VERIFY THAT WIRING AND SUPPORT COMPONENTS FOR EQUIPMENT ARE COMPLETE AND TESTED.

F. EXECUTE START-UP UNDER SUPERVISION OF RESPONSIBLE MANUFACTURER'S REPRESENTATIVE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

G. WHEN SPECIFIED IN INDIVIDUAL SPECIFICATION SECTIONS, REQUIRE MANUFACTURER TO PROVIDE AUTHORIZED REPRESENTATIVE TO BE PRESENT AT SITE TO INSPECT, CHECK, AND APPROVE EQUIPMENT OR SYSTEM INSTALLATION PRIOR TO START-UP, AND TO SUPERVISE PLACING EQUIPMENT OR SYSTEM IN OPERATION.

H. SUBMIT A WRITTEN REPORT THAT EQUIPMENT OR SYSTEM HAS BEEN PROPERLY INSTALLED AND IS FUNCTIONING CORRECTLY.

1.15 ADJUSTMENTS AND OWNER'S INSTRUCTIONS

A. AFTER COMPLETION OF THE INSTALLATION WORK CALLED FOR IN THE CONTRACT DOCUMENTS, FURNISH NECESSARY MECHANICS OR ENGINEERS FOR THE ADJUSTMENT AND OPERATION OF THE SYSTEMS, TO THE END THAT THE SYSTEMS ARE PERFECTLY ADJUSTED AND TURNED OVER TO THE OWNER IN PERFECT WORKING ORDER. FURTHER INSTRUCT THE OWNER'S AUTHORIZED REPRESENTATIVE IN THE CARE AND OPERATION OF THE INSTALLATION, PROVIDING FRAMED INSTRUCTION CHARTS, DIRECTIONS, AND OTHER RELATED ITEMS.

B. INSTRUCTORS PROVIDING OWNER TRAINING SHALL BE EXPERIENCED AND FAMILIAR WITH THE JOBSITE.

1.16 TESTING

A. AFTER THE ENTIRE INSTALLATION IS COMPLETED AND READY FOR OPERATION, TEST THE SYSTEMS AS OUTLINED IN DIVISION 23 SECTION "TESTING, ADJUSTING AND BALANCING FOR MECHANICAL SYSTEMS." THESE TESTS ARE SUPPLEMENTARY TO DETAILED TESTS SPECIFIED HEREIN OR DIRECTED. THE OWNER WILL PROVIDE WATER AND ELECTRIC CURRENT FOR THE TEST. PROVIDE NECESSARY LABOR, TEST PUMP, GAUGES, METERS, OTHER INSTRUMENTS, AND MATERIALS. PERFORM TESTS IN THE PRESENCE OF THE ARCHITECT OR HIS REPRESENTATIVE.

B. PERFORM OTHER TESTS SPECIFIED IN INDIVIDUAL SECTIONS OF THIS SPECIFICATION.

1.17 COMPLETION OF SYSTEMS

A. THE FOLLOWING MECHANICAL SYSTEMS SHALL NOT BE COMPLETE UNTIL THE FOLLOWING CONDITIONS ARE SATISFIED:

1. DUCTWORK SYSTEMS:
   A. DUCTWORK AND RELATED COMPONENTS AND ACCESSORIES SHALL BE COMPLETELY INSTALLED AND INSULATED AS SPECIFIED.
   B. DUCTWORK SHALL BE BALANCED AND A BALANCING REPORT SHALL BE SUBMITTED AND APPROVED.
2. PIPING SYSTEMS:
   A. PIPING, VALVES AND ACCESSORIES SHALL BE COMPLETELY INSTALLED, INSULATED AND LABELED AS SPECIFIED.
   B. PIPING PRESSURE TESTING BE COMPLETED AND PRESSURE TESTING REPORTS SHALL BE SUBMITTED AND APPROVED.
   C. PIPING SYSTEMS SHALL BE BALANCED AND A BALANCING REPORT SHALL BE SUBMITTED AND APPROVED.
3. EQUIPMENT:
   D. EQUIPMENT, INCLUDING BUT NOT LIMITED TO BOILERS, HEAT EXCHANGERS, TERMINAL HEAT TRANSFER UNITS, PUMPS, AIR HANDLING UNITS, CONDENSING UNITS, SPLIT SYSTEM AIR CONDITIONING EQUIPMENT, AND EXHAUST FANS, SHALL BE COMPLETELY INSTALLED.
   E. EQUIPMENT START-UP REPORTS SHALL BE COMPLETED, SUBMITTED AND APPROVED.
   F. EQUIPMENT BALANCING SHALL BE COMPLETED AND THE BALANCING REPORT SHALL BE SUBMITTED AND APPROVED.

1.18 OPERATING AND MAINTENANCE MANUALS

A. FURNISH 2 BOUND OPERATING AND MAINTENANCE MANUALS AND FORWARD TO THE ARCHITECT FOR REVIEW AND TRANSMITTAL TO THE OWNER.

B. FOR MAINTENANCE PURPOSES, PROVIDE APPROVED SUBMITTALS, PARTS LISTS, SPECIFICATIONS, AND MANUFACTURER'S MAINTENANCE BULLETINS FOR EACH PIECE OF EQUIPMENT. FOR MATERIALS USED WHICH HAVE BEEN SUBMITTED TO THE ARCHITECT FOR APPROVAL BUT DO NOT REQUIRE REGULAR MAINTENANCE, SUCH AS PIPING, DUCTWORK, AND INSULATION, PROVIDE ONE COPY OF APPROVED SUBMITTALS.

C. PROVIDE NAME, ADDRESS AND TELEPHONE NUMBER OF THE MANUFACTURER'S REPRESENTATIVE AND SERVICE COMPANY, FOR EACH PIECE OF EQUIPMENT OR MATERIAL SO THAT SERVICE OR SPARE PARTS CAN BE READILY OBTAINED.

1.19 WARRANTY

A. PROVIDE GUARANTEES AND WARRANTIES FOR WORK UNDER THIS CONTRACT AS INDICATED IN THE GENERAL REQUIREMENTS OF THE CONTRACT.

B. PROVIDE MANUFACTURERS' STANDARD WARRANTIES AND GUARANTEES FOR WORK BY THE MECHANICAL TRADES. HOWEVER, SUCH WARRANTIES AND GUARANTEES SHALL BE IN ADDITION TO AND NOT IN LIEU OF OTHER LIABILITIES WHICH THE MANUFACTURER AND THE MECHANICAL CONTRACTOR MAY HAVE BY LAW OR BY OTHER PROVISIONS OF THE CONTRACT DOCUMENTS.

C. GUARANTEE THAT ELEMENTS OF THE SYSTEMS PROVIDED UNDER THIS CONTRACT ARE OF SUFFICIENT CAPACITY TO MEET THE SPECIFIED PERFORMANCE REQUIREMENTS AS SET FORTH IN THESE SPECIFICATIONS OR AS INDICATED ON THE DRAWINGS.

C. UPON RECEIPT OF NOTICE FROM THE OWNER OF FAILURE OF ANY PART OF THE MECHANICAL SYSTEMS OR EQUIPMENT DURING THE WARRANTY PERIOD, THE MECHANICAL SUBCONTRACTOR SHALL REPLACE THE AFFECTED PART OR PARTS.

D. FURNISH A WRITTEN GUARANTEE COVERING THE ABOVE REQUIREMENTS BEFORE SUBMITTING THE APPLICATION FOR FINAL PAYMENT.

END OF SECTION 230500

SECTION 230517 – SLEEVES AND ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PIPE SLEEVES.
B. WATERTIGHT PIPE SLEEVES.
C. ESCUTCHEONS.
D. FLOOR PLATES.

1.2 PERFORMANCE REQUIREMENTS

A. PROVIDE SLEEVES FOR PIPING PENETRATIONS OF BUILDING CONSTRUCTION SUCH AS INTERIOR PARTITIONS, INTERIOR AND EXTERIOR WALLS, FLOORS, AND ROOFS.

B. PROVIDE WATERTIGHT PIPE SLEEVES FOR PIPING PENETRATIONS OF BASEMENT AND FOUNDATION WALLS BELOW GRADE, ON-GRADE FLOOR SLABS, FLOORS IN POTENTIALLY WET LOCATIONS, ROOF SLABS, AND AT OTHER LOCATIONS AS SPECIFIED OR INDICATED ON THE DRAWINGS.

C. PROVIDE ESCUTCHEONS AND FLOOR PLATES AT PIPING PENETRATIONS OF BUILDING CONSTRUCTION.

1.3 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

B. MANUFACTURER'S INSTALLATION INSTRUCTIONS: INDICATE SPECIAL PROCEDURES, AND EXTERNAL CONTROLS.

1.4 DELIVERY, STORAGE, AND HANDLING

A. DELIVER, STORE, PROTECT AND HANDLE PRODUCTS TO SITE UNDER PROVISIONS OF DIVISION 01.

B. PROTECT MATERIALS FROM EXPOSURE BY LEAVING FACTORY COVERINGS AND PACKAGING IN PLACE UNTIL INSTALLATION.

PART 2 - PRODUCTS

2.1 PIPE SLEEVES

A. CAST-IRON WALL PIPES: CAST OR FABRICATED OF CAST OR DUCTILE IRON AND EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP UNLESS OTHERWISE INDICATED.

B. GALVANIZED-STEEL WALL PIPES: ASTM A53, SCHEDULE 40, WITH PLAIN ENDS AND WELDED STEEL COLLAR; ZINC COATED.

C. GALVANIZED-STEEL-PIPE SLEEVES: ASTM A53, TYPE E, GRADE B, SCHEDULE 40, ZINC COATED, WITH PLAIN ENDS.

D. GALVANIZED-STEEL-SHEET SLEEVES: 0.0239-INCH (0.6-MM) MINIMUM THICKNESS; ROUND TUBE CLOSED WITH WELDED LONGITUDINAL JOINT.

2.2 WATERTIGHT PIPE SLEEVES

A. MANUFACTURERS:

1. PIPELINE SEAL AND INSULATOR, INC., A DIVISION OF ENPRO INDUSTRIES, INC. - THUNDERLINE LINK-SEAL PRODUCT LINE.
2. ADVANCE PRODUCTS & SYSTEMS, INC. – INNERLYNX PRODUCT LINE.
3. CALPICO, INC. – PIPE LINX PRODUCT LINE.
4. METRAFLEX COMPANY – METRASEAL PRODUCT LINE.
5. PROCO PRODUCTS, INC. – PEN-SEAL PRODUCT LINE.

B. SEALING ELEMENT ASSEMBLY: MODULAR MECHANICAL SEAL, CONSISTING OF RUBBER LINKS SHAPED TO CONTINUOUSLY FILL THE ANNULAR SPACE BETWEEN THE PIPE AND THE WALL OPENING. COMPRESSION HARDWARE SHALL CONSIST OF HEX-HEAD NUTS AND BOLTS. PRESSURE PLATES AT EACH BOLT SHALL SPREAD THE TENSIONAL FORCES EVENLY FROM THE HARDWARE TO THE LINKS. EACH LINK SHALL HAVE PERMANENT IDENTIFICATION OF THE SIZE AND MANUFACTURER'S NAME MOLDED INTO THE PRESSURE PLATE AND SEALING ELEMENT.

1. LINKS: RUBBER OF MATERIAL SUITABLE FOR THE APPLICATION. COLORATION SHALL BE THROUGHOUT RUBBER FOR POSITIVE FIELD INSPECTION. SELECT MATERIAL FOR THE ANTICIPATED EXPOSURE TO CHEMICALS AND LIGHT, AND THE ANTICIPATED TEMPERATURE RANGE. SUSTAINED OPERATION NEAR TEMPERATURE LIMITS MAY AFFECT LIFE EXPECTANCY; SELECT ACCORDINGLY.
   A. STANDARD (BLACK) EPDM RUBBER SHALL BE RESISTANT TO MOST INORGANIC ACIDS AND ALKALIS, AND SOME ORGANIC CHEMICALS (INCLUDING ACETONE, ALCOHOL, AND KETONES). SUITABLE FOR USE IN WATER, DIRECT GROUND BURIAL IN UNCONTAMINATED SOILS, AND ATMOSPHERIC CONDITIONS. TEMPERATURE RANGE: -40 TO 250 DEGREES F (-40 TO 121 DEGREES C).
   B. LOW-DUROMETER (BLUE) EPDM RUBBER SHALL BE SUITABLE FOR THINWALL AND FRAGILE PIPING AND TUBING WHICH MAY NOT WITHSTAND THE COMPRESSING FORCES GENERATED BY A STANDARD SEAL. TEMPERATURE RANGE: -40 TO 250 DEGREES F (-40 TO 121 DEGREES C).
   C. NITRILE (GREEN) RUBBER SHALL BE RESISTANT TO OILS, FUEL, AND MANY SOLVENTS (INCLUDING GASOLINE, MOTOR OIL, KEROSENE, METHANE, JET FUEL, HYDRAULIC FLUID, AND WATER). WHILE RESISTANT TO NORMAL ATMOSPHERIC CONDITIONS, NITRILE IS NOT U.V. RESISTANT, THEREFORE NOT SUITABLE FOR LOCATIONS EXPOSED TO DIRECT OR INDIRECT SUNLIGHT. TEMPERATURE RANGE: -40 TO 210 DEGREES F (-40 TO 99 DEGREES C).
   D. SILICONE (GREY) RUBBER SHALL BE SUITABLE FOR TEMPERATURE EXTREMES, AND SHALL BE ONE-HOUR FM (FACTORY MUTUAL) APPROVED. TEMPERATURE RANGE: -67 TO 400 DEGREES F (-55 TO 204 DEGREES C).
2. PRESSURE PLATES: PLATES USED WITH EPDM AND NITRILE RUBBER LINKS SHALL BE COMPOSITE, MOLDED OF GLASS REINFORCED NYLON. PLATES USED WITH SILICONE RUBBER LINKS SHALL BE STEEL, WITH ZINC-DICHROMATE PLATING FOR CORROSION RESISTANCE.
3. HARDWARE: MILD STEEL WITH A 2-PART ZINC DICHROMATE COATING PER ASTM B-633 AND ORGANIC COATING, TESTED IN ACCORDANCE WITH ASTM B-117 TO PASS A 1,500-HOUR SALT SPRAY TEST, OR TYPE 316 STAINLESS STEEL. 60,000 PSI (413 MPA) MINIMUM TENSILE STRENGTH.

C. SLEEVE: PROVIDE SMOOTH, CORE-DRILLED HOLE IN CONCRETE CONSTRUCTION, OR A METAL OR PLASTIC PIPE SLEEVE.

1. METAL SLEEVES: CAST IRON PIPE WHEN INSTALLED BELOW GRADE OR IN LOCATIONS WHICH CAN BE ANTICIPATED TO OFTEN BE WET OR DAMP. GALVANIZED STEEL SCHEDULE 40 PIPE WHEN INSTALLED IN NORMALLY-DRY LOCATIONS.
2. PLASTIC PIPE SLEEVES: SCHEDULE 40 PVC, ABS, OR AQUATHERM POLYPROPYLENE PIPE.
3. MOLDED PIPE SLEEVES FOR CASTING INTO CONCRETE: HIGH DENSITY POLYETHYLENE (HDPE) OR POLYVINYL CHLORIDE (PVC) PLASTIC, WITH END CAPS AND REINFORCING RIBS, AND INTEGRAL HOLLOW, MOLDED WATER-STOP RING 4 INCH (100 MM) LARGER THAN THE OUTSIDE DIAMETER OF THE SLEEVE ITSELF.

2.3 ESCUTCHEONS

A. MATERIAL: BRASS AT FLOORS AND IN POTENTIALLY DAMP OR WET LOCATIONS. BRASS OR STEEL IN OTHER LOCATIONS.

B. FINISH: EXCEPT AS INDICATED BELOW, POLISHED CHROME PLATED IN EXPOSED LOCATIONS, PRIME PAINTED STEEL OR ROUGH BRASS IN MECHANICAL ROOMS AND SIMILAR SPACES.

C. ONE-PIECE, CAST-BRASS TYPE: WITH FINISH AND SETSCREW FASTENER.

D. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

E. ONE-PIECE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

F. SPLIT-CASTING BRASS TYPE: WITH CONCEALED HINGE AND SETSCREW.

G. SPLIT-PLATE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH, HINGE, AND SPRING-CLIP FASTENERS.

2.4 FLOOR PLATES

A. MATERIAL: BRASS IN EXPOSED LOCATIONS. BRASS OR CAST IRON IN OTHER LOCATIONS INCLUDING MECHANICAL EQUIPMENT SPACES.

B. FINISH: EXCEPT AS INDICATED BELOW, POLISHED CHROME PLATED IN EXPOSED LOCATIONS, PRIME PAINTED STEEL OR ROUGH BRASS IN MECHANICAL ROOMS AND SIMILAR SPACES.

C. ONE-PIECE FLOOR PLATES: CAST-IRON FLANGE.

D. SPLIT-CASTING FLOOR PLATES: CAST BRASS WITH CONCEALED HINGE.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. PROVIDE SLEEVES FOR PIPING PASSING THROUGH PENETRATIONS IN FLOORS, PARTITIONS, ROOFS, AND WALLS.

C. INSTALL SLEEVES IN CONCRETE FLOORS, CONCRETE ROOF SLABS, AND CONCRETE WALLS AS THE SLABS AND WALLS ARE CONSTRUCTED.

D. SIZE SLEEVES TO ALLOW FIRESTOPPING.

E. SIZE HOLES AND SLEEVES TO ALLOW THE REQUIRED CLEAR ANNULAR SPACE FOR INSULATION, AND A MINIMUM OF 1/4 IN. (6.4 MM) CLEAR OUTSIDE THE PIPE AND INSULATION FOR MOVEMENT DUE TO AND EXPANSION AND CONTRACTION.

F. WATERTIGHT PIPE SLEEVES: PROVIDE WATERTIGHT PIPE SLEEVE SYSTEMS IN PENETRATIONS OF EXTERIOR CONCRETE WALLS AND SLABS-ON-GRADE AT SERVICE PIPING ENTRIES INTO BUILDING, AND AT OTHER LOCATIONS AS SPECIFIED OR INDICATED ON THE DRAWINGS.

1. PROVIDE SMOOTH, CORE-DRILLED HOLE IN CONCRETE CONSTRUCTION, OR A METAL OR PLASTIC PIPE SLEEVE.
2. FOR CORE-DRILLED HOLES, ADDITIONAL SLEEVES AREN'T REQUIRED. GRIND AND GROUT SURFACES OF HOLES SMOOTH AS REQUIRED FOR A TIGHT SEAL.
3. SIZE HOLES AND SLEEVES TO ALLOW THE REQUIRED CLEAR ANNULAR SPACE FOR THE SEALING SYSTEM.
4. SELECT TYPE, SIZE, AND NUMBER OF SEALING LINK ELEMENTS REQUIRED FOR PIPING MATERIAL AND SIZE AND FOR SLEEVE ID OR HOLE SIZE.
5. POSITION PIPING IN CENTER OF SLEEVE. CENTER PIPING IN PENETRATION, ASSEMBLE WATERTIGHT SEAL SYSTEM COMPONENTS, AND INSTALL IN ANNULAR SPACE BETWEEN PIPING AND SLEEVE. TIGHTEN BOLTS AGAINST PRESSURE PLATES THAT CAUSE SEALING ELEMENTS TO EXPAND AND MAKE A WATERTIGHT SEAL.

G. CUT SLEEVES FLUSH WITH BOTH SURFACES, EXCEPT AT FLOORS.

H. FASTEN SLEEVES PERMANENTLY IN PLACE.

I. USING GROUT, SEAL THE SPACE OUTSIDE OF SLEEVES IN CONCRETE SLABS AND WALLS WHICH DO NOT HAVE WATERTIGHT SLEEVE SYSTEM.

J. PROVIDE ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FINISHED FLOORS.

K. PROVIDE FLOOR PLATES FOR PIPING PENETRATIONS OF EQUIPMENT-ROOM FLOORS.

L. ESCUTCHEONS AND FLOOR PLATES ON BARE PIPING SHALL BE ONE-PIECE TYPE WHERE POSSIBLE. ESCUTCHEONS AND FLOOR PLATES ON INSULATED PIPING AND ON EXISTING PIPING SHALL BE SPLIT, HINGED TYPE.

M. SIZE ESCUTCHEONS AND FLOOR PLATES WITH ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF PIPING AND WITH OD THAT COMPLETELY COVERS OPENING.

END OF SECTION 230517

SECTION 230519 – METERS AND GAUGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PRESSURE GAUGES AND PRESSURE GAUGE TAPS.
B. THERMOMETERS AND THERMOMETER WELLS.
C. THERMOWELL HEAT TRANSFER PASTE.

1.2 SUBMITTALS

A. PRODUCT DATA: PROVIDE MANUFACTURERS DATA AND LIST WHICH INDICATES USE, OPERATING RANGE, TOTAL RANGE, ACCURACY, AND LOCATION FOR MANUFACTURED COMPONENTS.

PART 2 - PRODUCTS

2.1 PRESSURE GAUGES

A. MANUFACTURERS:

1. WEISS.
2. TRERICE.
3. MARSHALLTOWN.
4. AMTEK.
5. DWYER.

B. GAUGES, HOT WATER HEATING SYSTEMS: WEISS SERIES 4PG-1 INDUSTRIAL PRESSURE GAUGE, DRY NON-FILLED TYPE, WITH PHOSPHOR BRONZE BOURDON TUBE, SILVER BRAZED CONNECTING JOINTS, BRASS SOCKET, BUSHED STAINLESS ROTARY MOVEMENT, 1/4-INCH NPT CONNECTION, WHITE ALUMINUM DIAL WITH BLACK MARKINGS, BLACK ALUMINUM POINTER WITH FRONT SLOTTED ADJUSTMENT.

1. CASE: CAST ALUMINUM OR STAINLESS STEEL.
2. LENS: PUSH-IN LEXAN POLYCARBONATE, OR CLEAR GLASS OR ACRYLIC WITH STAINLESS STEEL RING, PER MANUFACTURER'S STANDARD.
3. BOURDON TUBE: PHOSPHOR BRONZE.
4. DIAL SIZE: 4 TO 4-1/2 INCH (101 TO 114 MM).
5. CONNECTION: LOWER OR LOWER BACK, 1/4 INCH OR 1/2 INCH NPT, AS SELECTED BY CONTRACTOR.
6. ACCURACY: 1 PERCENT OF FULL SCALE RANGE, PER ANSI-ASME B40.1 GRADE 1A.
7. SCALE: PSI.
8. RANGE: 0-60 PSIG TYPICAL, SELECT FOR APPLICATION.

C. VERIFY SUITABILITY OF RANGE FOR EACH APPLICATION. BEST SELECTION IS FOR TYPICAL READING TO BE CLOSE TO MID-SCALE.

2.2 PRESSURE GAUGE TAPPINGS

A. BALL VALVE: PROVIDE UNDER DIVISION 23 SECTION "HYDRONIC PIPING."

B. PULSATION DAMPER:

1. MANUFACTURERS:
   A. WEISS.
   B. TRERICE.
   C. MARSHALLTOWN.
   D. AMTEK.
   E. DWYER.
2. PRESSURE SNUBBER, BRASS WITH 1/4 INCH (6 MM) NPT CONNECTIONS.

2.3 TEMPERATURE TRANSMITTER - DIGITAL SELF-INDICATING

A. MANUFACTURERS:

1. WEISS.
2. OR APPROVED EQUAL.

B. THERMOMETER: WEISS VARI-ANGLE SELF-INDICATING TEMPERATURE TRANSMITTER, HIGH-IMPACT BLACK ABS PLASTIC CASE, ADJUSTABLE ANGLE AND SWIVEL HEAD. LIGHT-POWERED, NO BATTERIES. STEM ASSEMBLY SHALL BE IN FULL CONFORMANCE WITH FED. SPEC GG-T-321D FOR INDUSTRIAL GLASS THERMOMETERS, OR ASTM B40.3-1990 FOR BIMETALLIC DIAL THERMOMETERS. RECALIBRATION VIA POTENTIOMETER ADJUSTMENT.

1. SENSOR TYPE: GLASS PASSIVATED THERMISTOR.
2. SIZE: 1/2 INCH (12.5 MM) HIGH LCD DIGITS.
3. BULB: PROVIDE EXTENDED BULB FOR SOCKET EXTENSION IN INSULATED PIPE.
4. ACCURACY: 1 PERCENT OF READING OR 1 DEGREE, WHICHEVER IS GREATER.
5. CALIBRATION: SWITCHABLE FOR DEGREES F AND DEGREES C.
6. SCALE RANGE: -50 TO 300° F (-45 TO 150° C).
7. GRADUATIONS: 1/10 DEGREE BETWEEN -19.9 TO 199.9° F (-28 TO 93° C).
8. AMBIENT OPERATING RANGE: -30 TO 140° F (-35 TO 60° C).
9. AMBIENT TEMPERATURE ERROR: ZERO.
10. ALLOWABLE HUMIDITY: 0 TO 100 PERCENT RH.
11. UPDATE: 10 SECONDS.
12. LIGHT REQUIREMENT: 10 LUX (1 FOOT-CANDLE).
13. AIR DUCT FLANGE: PROVIDE FOR DUCT APPLICATIONS.

C. TRANSMITTER:

1. SENSOR TYPE: PLATINUM 100 OHM RTD.
2. OUTPUT: 4 TO 20 MA.
3. POWER REQUIREMENT: 8.5 TO 35 VDC.
4. ACCURACY: 0.5 PERCENT OF SPAN.
5. RANGE: -58 TO 302° F (-50 TO 150 DEGREES C).
6. GRADUATIONS: 1/10 DEGREE BETWEEN -19.9 TO 199.9° F (-28 TO 93° C).
7. AMBIENT OPERATING RANGE: -15 TO 185° F (-25 TO 85° C).
8. AMBIENT TEMPERATURE ERROR: 0.015 PERCENT OF SPAN.

D. PROVIDE CONDUIT CONNECTOR.

E. PROVIDE OUTDOOR WATERPROOF COVER FOR WET LOCATIONS.

2.4 TEST PLUGS

A. TEST PLUG:

1. MANUFACTURERS:
   A. PETERSON EQUIPMENT CO., INC., "PETE'S PLUGS".
   B. WEISS.
   C. FLOW DESIGN, INC.
   D. TRERICE.
2. 1/2 INCH (13 MM) NPT BRASS FITTING AND CAP FOR RECEIVING 1/8 INCH (3 MM) OUTSIDE DIAMETER PRESSURE OR TEMPERATURE PROBE WITH SELF-CLOSING VALVES AS FOLLOWS:
   A. NORDEL (EPDM) CORE FOR WATER AND HYDRONIC HEATING AND COOLING SERVICE, TEMPERATURES RANGE 30 TO 275° F (-1 TO 176°C).
   B. NEOPRENE CORE FOR NATURAL GAS OR LP GAS SERVICE, TEMPERATURE RANGE -40 TO 150° F (-40 TO 65° C).
   C. VERIFY CORE SUITABILITY FOR OTHER FLUIDS AND TEMPERATURES.
3. WORKING PRESSURE: 500 PSIG
4. CAP RETAINING STRAP: COLOR CODED TO INDICATE CORE MATERIAL.
5. CONSTRUCTION WITH EITHER DUAL SELF-CLOSING VALVES (PETE'S PLUG STANDARD DESIGN) OR SINGLE VALVE ARE ALLOWED.

2.5 THERMOMETER SUPPORTS

A. SOCKET (THERMOMETER WELL) FOR PIPING: BRASS SEPARABLE SOCKETS FOR THERMOMETER STEMS, WITH EXTENSIONS FOR INSULATED PIPING. PROVIDE WITH HONEYWELL VISCOUS HEAT TRANSFER PASTE.

2.6 THERMOWELL HEAT TRANSFER PASTE

A. MANUFACTURERS:

1. MG CHEMICALS.
2. HONEYWELL.
3. TRERICE.

B. DESCRIPTION:

1. FORMULATION: SILICONE OR SYNTHETIC BASE, CONTAINING METAL OXIDES.
2. THERMAL CONDUCTIVITY: AT LEAST 4.5 BTU-IN./(HR-FT^2-ºF) (0.65 W/(M-K).
3. TEMPERATURE RANGE: TO 392° F (200° C).
4. FLASH POINT: 500° F (260° C).
5. DROPPING POINT: ASTM D566, GREATER THAN 500 DEGREES F (260 DEGREES C).
6. SPECIFIC GRAVITY: 2.3 MINIMUM AT 77° F (25° C).
7. CONSISTENCY: ASTM D217, 310 TO 320.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL 1 PRESSURE GAUGE PER PUMP, WITH TAPS ON SUCTION AND DISCHARGE OF PUMP; PIPE TO GAUGE.

B. FILL THERMOMETER SOCKETS WITH HEAT TRANSFER PASTE.

C. PROVIDE INSTRUMENTS WITH SCALE RANGES SELECTED ACCORDING TO SERVICE WITH LARGEST APPROPRIATE SCALE.

D. INSTALL GAUGES AND THERMOMETERS IN LOCATIONS WHERE THEY ARE EASILY READ FROM NORMAL OPERATING LEVEL. INSTALL VERTICAL TO 45 DEGREES OFF VERTICAL.

E. ADJUST GAUGES AND THERMOMETERS TO FINAL ANGLE, CLEAN WINDOWS AND LENSES, AND CALIBRATE TO ZERO.

F. LOCATE TEST PLUGS WHERE INDICATED.

G. PROVIDE PRESSURE GAUGE AT HIGH POINT OF SYSTEM FOR SETTING OF COLD WATER MAKE-UP PRESSURE REDUCING VALVE.

H. PROVIDE PRESSURE GAUGE AT CONNECTION TO BLADDER TYPE EXPANSION TANK FOR SETTING OF AIR SIDE PRE-CHARGE PRESSURE.

END OF SECTION 230519

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TOWN OF SANBORNTON · GRANTED 1748 · INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER – 10/20/2021
SCALE:	N.T.S.	
DESN. BY:	MJB	
DRAWN BY:	DTV	
CHKD BY:	TWB	
ISSUE DATE:	10/20/2021	

REVISIONS

SHEET TITLE:

SPECIFICATIONS

M5.1

SPECIFICATIONS M5.1

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SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. METAL PIPE HANGERS AND SUPPORTS.
2. TRAPEZE PIPE HANGERS.
3. METAL FRAMING SYSTEMS.
4. PIPE STANDS.
5. EQUIPMENT SUPPORTS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.
B. SHOP DRAWINGS: SHOW FABRICATION AND INSTALLATION DETAILS AND INCLUDE CALCULATIONS FOR THE FOLLOWING; INCLUDE PRODUCT DATA FOR COMPONENTS:
1. TRAPEZE PIPE HANGERS.
2. METAL FRAMING SYSTEMS.
3. PIPE STANDS.
4. EQUIPMENT SUPPORTS.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. STRUCTURAL PERFORMANCE: HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS INDICATED ACCORDING TO ASCE/SEI 7
1. DESIGN SUPPORTS FOR MULTIPLE PIPES, INCLUDING PIPE STANDS, CAPABLE OF SUPPORTING COMBINED WEIGHT OF SUPPORTED SYSTEMS, SYSTEM CONTENTS, AND TEST WATER.
2. DESIGN EQUIPMENT SUPPORTS CAPABLE OF SUPPORTING COMBINED OPERATING WEIGHT OF SUPPORTED EQUIPMENT AND CONNECTED SYSTEMS AND COMPONENTS.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. CARBON-STEEL PIPE HANGERS AND SUPPORTS:
1. DESCRIPTION: MSS SP-58, TYPES 1 THROUGH 58, FACTORY-FABRICATED COMPONENTS.
2. GALVANIZED METALLIC COATINGS: PREGALVANIZED, HOT-DIP GALVANIZED, OR ELECTRO-GALVANIZED.
3. NONMETALLIC COATINGS: PLASTIC COATED, OR EPOXY POWDER-COATED.
4. PADDED HANGERS: HANGER WITH FIBERGLASS OR OTHER PIPE INSULATION PAD OR CUSHION TO SUPPORT BEARING SURFACE OF PIPING.
5. HANGER RODS: CONTINUOUS-THREAD ROD, NUTS, AND WASHER MADE OF CARBON STEEL

B. COPPER PIPE AND TUBE HANGERS:
1. DESCRIPTION: MSS SP-58, TYPES 1 THROUGH 58, COPPER-PLATED STEEL, FACTORY-FABRICATED COMPONENTS.
2. HANGER RODS: CONTINUOUS-THREAD ROD, NUTS, AND WASHER MADE OF COPPER-PLATED STEEL.

2.3 TRAPEZE PIPE HANGERS

A. DESCRIPTION: MSS SP-58, TYPE 59, SHOP- OR FIELD-FABRICATED PIPE-SUPPORT ASSEMBLY MADE FROM STRUCTURAL CARBON-STEEL SHAPES WITH MSS SP-58 CARBON-STEEL HANGER RODS, NUTS, SADDLES, AND U-BOLTS.

2.4 METAL FRAMING SYSTEMS

A. MFMA MANUFACTURER METAL FRAMING SYSTEMS:
1. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   A. <u>COOPER B-LINE; BRAND OF EATON, ELECTRICAL SECTOR</u>.
   B. <u>FLEX-STRUT INC</u>.
   C. <u>MIRO INDUSTRIES</u>.
   D. <u>UNISTRUT; ATKORE INTERNATIONAL</u>.
2. DESCRIPTION: SHOP- OR FIELD-FABRICATED, PIPE-SUPPORT ASSEMBLY MADE OF STEEL CHANNELS, ACCESSORIES, FITTINGS, AND OTHER COMPONENTS FOR SUPPORTING MULTIPLE PARALLEL PIPES.
3. STANDARD: COMPLY WITH MFMA-4 FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY.
4. CHANNELS: CONTINUOUS SLOTTED CARBON-STEEL CHANNEL WITH INTURNED LIPS.
5. CHANNEL WIDTH: SELECTED FOR APPLICABLE LOAD CRITERIA.
6. CHANNEL NUTS: FORMED OR STAMPED NUTS OR OTHER DEVICES DESIGNED TO FIT INTO CHANNEL SLOT AND, WHEN TIGHTENED, PREVENT SLIPPING ALONG CHANNEL.
7. HANGER RODS: CONTINUOUS-THREAD ROD, NUTS, AND WASHER MADE OF CARBON STEEL.
8. METALLIC COATING: PREGALVANIZED G90 HOT-DIP GALVANIZED.

2.5 THERMAL-HANGER SHIELD INSERTS

A. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. <u>BUCKAROOS, INC</u>.
2. <u>CARPENTER & PATERSON, INC</u>.
3. <u>NATIONAL PIPE HANGER CORPORATION</u>.
4. <u>PIPE SHIELDS INC</u>.
5. <u>PIPING TECHNOLOGY & PRODUCTS, INC</u>.

B. INSULATION-INSERT MATERIAL FOR COLD PIPING: ASTM C 552, TYPE II CELLULAR GLASS WITH 100-PSI OR ASTM C 591, TYPE VI, GRADE 1 POLYISOCYANURATE WITH 125-PSI MINIMUM COMPRESSIVE STRENGTH AND VAPOR BARRIER.
C. INSULATION-INSERT MATERIAL FOR HOT PIPING: WATER-REPELLENT-TREATED, ASTM C 533, TYPE I CALCIUM SILICATE WITH 100-PSI ASTM C 552, TYPE II CELLULAR GLASS WITH 100-PSI OR ASTM C 591, TYPE VI, GRADE 1 POLYISOCYANURATE WITH 125-PSI MINIMUM COMPRESSIVE STRENGTH.
D. FOR TRAPEZE OR CLAMPED SYSTEMS: INSERT AND SHIELD SHALL COVER ENTIRE CIRCUMFERENCE OF PIPE.
E. FOR CLEVIS OR BAND HANGERS: INSERT AND SHIELD SHALL COVER LOWER 180 DEGREES OF PIPE.
F. INSERT LENGTH: EXTEND 2 INCHES BEYOND SHEET METAL SHIELD FOR PIPING OPERATING BELOW AMBIENT AIR TEMPERATURE.

2.6 PIPE STANDS

A. GENERAL REQUIREMENTS FOR PIPE STANDS: SHOP- OR FIELD-FABRICATED ASSEMBLIES MADE OF MANUFACTURED CORROSION-RESISTANT COMPONENTS TO SUPPORT ROOF-MOUNTED PIPING.
B. COMPACT PIPE STAND:
1. DESCRIPTION: SINGLE BASE UNIT WITH INTEGRAL-ROD ROLLER, PIPE CLAMPS, OR V-SHAPED CRADLE TO SUPPORT PIPE, FOR ROOF INSTALLATION WITHOUT MEMBRANE PENETRATION.
2. BASE: SINGLE, VULCANIZED RUBBER, MOLDED POLYPROPYLENE, OR POLYCARBONATE.
3. HARDWARE: GALVANIZED STEEL OR POLYCARBONATE.
4. ACCESSORIES: PROTECTION PADS.

C. LOW-PROFILE, SINGLE BASE, SINGLE-PIPE STAND:
1. DESCRIPTION: SINGLE BASE WITH VERTICAL AND HORIZONTAL MEMBERS, AND PIPE SUPPORT, FOR ROOF INSTALLATION WITHOUT MEMBRANE PROTECTION.
2. BASE: SINGLE, VULCANIZED RUBBER, MOLDED POLYPROPYLENE, OR POLYCARBONATE.
3. VERTICAL MEMBERS: TWO, GALVANIZED-STEEL, CONTINUOUS-THREAD 1/2-INCH RODS.
4. HORIZONTAL MEMBER: ADJUSTABLE HORIZONTAL, GALVANIZED-STEEL PIPE SUPPORT CHANNELS.
5. PIPE SUPPORTS: ROLLER, STRUT CLAMPS, CLEVIS HANGER, OR SWIVEL HANGER.
6. HARDWARE: GALVANIZED STEEL.
7. ACCESSORIES: PROTECTION PADS.
8. HEIGHT: 12 INCHES ABOVE ROOF.

D. CURB-MOUNTED-TYPE PIPE STANDS: SHOP- OR FIELD-FABRICATED PIPE SUPPORTS MADE FROM STRUCTURAL-STEEL SHAPES, CONTINUOUS-THREAD RODS, AND ROLLERS, FOR MOUNTING ON PERMANENT STATIONARY ROOF CURB.

2.7 EQUIPMENT SUPPORTS

A. DESCRIPTION: WELDED, SHOP- OR FIELD-FABRICATED EQUIPMENT SUPPORT MADE FROM STRUCTURAL CARBON-STEEL SHAPES.

2.8 MATERIALS

A. ALUMINUM: ASTM B 221.
B. CARBON STEEL: ASTM A 1011/A 1011M.
C. STRUCTURAL STEEL: ASTM A 36/A 36M, CARBON-STEEL PLATES, SHAPES, AND BARS; GALVANIZED.
D. THREADED RODS: CONTINUOUSLY THREADED. ZINC-PLATED OR GALVANIZED STEEL FOR INDOOR APPLICATIONS AND STAINLESS STEEL FOR OUTDOOR APPLICATIONS. MATING NUTS AND WASHERS OF SIMILAR MATERIALS AS RODS.
E. GROUT: ASTM C 1107/C 1107M, FACTORY-MIXED AND -PACKAGED, DRY, HYDRAULIC-CEMENT, NONSHRINK AND NONMETALLIC GROUT; SUITABLE FOR INTERIOR AND EXTERIOR APPLICATIONS.
1. PROPERTIES: NONSTAINING, NONCORROSIVE, AND NONGASEOUS.
2. DESIGN MIX: 5000-PSI, 28-DAY COMPRESSIVE STRENGTH.

PART 3 - EXECUTION

3.1 APPLICATION

A. COMPLY WITH REQUIREMENTS IN SECTION 078413 "PENETRATION FIRESTOPPING" FOR FIRESTOPPING MATERIALS AND INSTALLATION FOR PENETRATIONS THROUGH FIRE-RATED WALLS, CEILINGS, AND ASSEMBLIES.
B. STRENGTH OF SUPPORT ASSEMBLIES: WHERE NOT INDICATED, SELECT SIZES OF COMPONENTS SO STRENGTH WILL BE ADEQUATE TO CARRY PRESENT AND FUTURE STATIC LOADS WITHIN SPECIFIED LOADING LIMITS. MINIMUM STATIC DESIGN LOAD USED FOR STRENGTH DETERMINATION SHALL BE WEIGHT OF SUPPORTED COMPONENTS PLUS 200 LB.

3.2 HANGER AND SUPPORT INSTALLATION

A. METAL PIPE-HANGER INSTALLATION: COMPLY WITH MSS SP-58. INSTALL HANGERS, SUPPORTS, CLAMPS, AND ATTACHMENTS AS REQUIRED TO PROPERLY SUPPORT PIPING FROM THE BUILDING STRUCTURE.
B. METAL TRAPEZE PIPE-HANGER INSTALLATION: COMPLY WITH MSS SP-58. ARRANGE FOR GROUPING OF PARALLEL RUNS OF HORIZONTAL PIPING, AND SUPPORT TOGETHER ON FIELD-FABRICATED TRAPEZE PIPE HANGERS.
1. PIPES OF VARIOUS SIZES: SUPPORT TOGETHER AND SPACE TRAPEZES FOR SMALLEST PIPE SIZE OR INSTALL INTERMEDIATE SUPPORTS FOR SMALLER DIAMETER PIPES AS SPECIFIED FOR INDIVIDUAL PIPE HANGERS.
2. FIELD FABRICATE FROM ASTM A 36/A 36M, CARBON-STEEL SHAPES SELECTED FOR LOADS BEING SUPPORTED. WELD STEEL ACCORDING TO AWS D1.1/D1.1M.

C. THERMAL-HANGER SHIELD INSTALLATION: INSTALL IN PIPE HANGER OR SHIELD FOR INSULATED PIPING.
D. PIPE STAND INSTALLATION:
1. PIPE STAND TYPES EXCEPT CURB-MOUNTED TYPE: ASSEMBLE COMPONENTS AND MOUNT ON SMOOTH ROOF SURFACE. DO NOT PENETRATE ROOF MEMBRANE.
2. CURB-MOUNTED-TYPE PIPE STANDS: ASSEMBLE COMPONENTS OR FABRICATE PIPE STAND AND MOUNT ON PERMANENT, STATIONARY ROOF CURB. SEE SECTION 077200 "ROOF ACCESSORIES" FOR CURBS.

E. INSTALL HANGERS AND SUPPORTS COMPLETE WITH NECESSARY ATTACHMENTS, INSERTS, BOLTS, RODS, NUTS, WASHERS, AND OTHER ACCESSORIES.
F. EQUIPMENT SUPPORT INSTALLATION: FABRICATE FROM WELDED-STRUCTURAL-STEEL SHAPES.
G. INSTALL HANGERS AND SUPPORTS TO ALLOW CONTROLLED THERMAL AND SEISMIC MOVEMENT OF PIPING SYSTEMS, TO PERMIT FREEDOM OF MOVEMENT BETWEEN PIPE ANCHORS, AND TO FACILITATE ACTION OF EXPANSION JOINTS, EXPANSION LOOPS, EXPANSION BENDS, AND SIMILAR UNITS.
H. INSTALL LATERAL BRACING WITH PIPE HANGERS AND SUPPORTS TO PREVENT SWAYING.
I. LOAD DISTRIBUTION: INSTALL HANGERS AND SUPPORTS SO THAT PIPING LIVE AND DEAD LOADS AND STRESSES FROM MOVEMENT WILL NOT BE TRANSMITTED TO CONNECTED EQUIPMENT.
J. INSULATED PIPING:
1. ATTACH CLAMPS AND SPACERS TO PIPING.
   A. PIPING OPERATING ABOVE AMBIENT AIR TEMPERATURE: CLAMP MAY PROJECT THROUGH INSULATION.
   B. PIPING OPERATING BELOW AMBIENT AIR TEMPERATURE: USE THERMAL-HANGER SHIELD INSERT WITH CLAMP SIZED TO MATCH OD OF INSERT.
   C. DO NOT EXCEED PIPE STRESS LIMITS ALLOWED BY ASME B31.9 FOR BUILDING SERVICES PIPING.
2. INSTALL MSS SP-58, TYPE 39, PROTECTION SADDLES IF INSULATION WITHOUT VAPOR BARRIER IS INDICATED. FILL INTERIOR VOIDS WITH INSULATION THAT MATCHES ADJOINING INSULATION.
   A. OPTION: THERMAL-HANGER SHIELD INSERTS MAY BE USED. INCLUDE STEEL WEIGHT-DISTRIBUTION PLATE FOR PIPE NPS 4 AND LARGER IF PIPE IS INSTALLED ON ROLLERS.
3. INSTALL MSS SP-58, TYPE 40, PROTECTIVE SHIELDS ON COLD PIPING WITH VAPOR BARRIER. SHIELDS SHALL SPAN AN ARC OF 180 DEGREES.
   A. OPTION: THERMAL-HANGER SHIELD INSERTS MAY BE USED. INCLUDE STEEL WEIGHT-DISTRIBUTION PLATE FOR PIPE NPS 4 AND LARGER IF PIPE IS INSTALLED ON ROLLERS.
4. SHIELD DIMENSIONS FOR PIPE: NOT LESS THAN THE FOLLOWING:
   A. NPS 1/4 TO NPS 3-1/2: 12 INCHES LONG AND 0.048 INCH THICK.
   B. NPS 4: 12 INCHES LONG AND 0.06 INCH THICK.
5. THERMAL-HANGER SHIELDS: INSTALL WITH INSULATION SAME THICKNESS AS PIPING INSULATION.

3.3 EQUIPMENT SUPPORTS

A. FABRICATE STRUCTURAL-STEEL STANDS TO SUSPEND EQUIPMENT FROM STRUCTURE OVERHEAD OR TO SUPPORT EQUIPMENT ABOVE FLOOR.
B. GROUTING: PLACE GROUT UNDER SUPPORTS FOR EQUIPMENT AND MAKE BEARING SURFACE SMOOTH.
C. PROVIDE LATERAL BRACING, TO PREVENT SWAYING, FOR EQUIPMENT SUPPORTS.

3.4 METAL FABRICATIONS

A. CUT, DRILL, AND FIT MISCELLANEOUS METAL FABRICATIONS FOR TRAPEZE PIPE HANGERS AND EQUIPMENT SUPPORTS.
B. FIT EXPOSED CONNECTIONS TOGETHER TO FORM HAIRLINE JOINTS. FIELD WELD CONNECTIONS THAT CANNOT BE SHOP WELDED BECAUSE OF SHIPPING SIZE LIMITATIONS.
C. FIELD WELDING: COMPLY WITH AWS D1.1/D1.1M PROCEDURES FOR SHIELDED, METAL ARC WELDING; APPEARANCE AND QUALITY OF WELDS; AND METHODS USED IN CORRECTING WELDING WORK; AND WITH THE FOLLOWING:
1. USE MATERIALS AND METHODS THAT MINIMIZE DISTORTION AND DEVELOP STRENGTH AND CORROSION RESISTANCE OF BASE METALS.
2. OBTAIN FUSION WITHOUT UNDERCUT OR OVERLAP.
3. REMOVE WELDING FLUX IMMEDIATELY.
4. FINISH WELDS AT EXPOSED CONNECTIONS SO NO ROUGHNESS SHOWS AFTER FINISHING AND SO CONTOURS OF WELDED SURFACES MATCH ADJACENT CONTOURS.

3.5 ADJUSTING

A. HANGER ADJUSTMENTS: ADJUST HANGERS TO DISTRIBUTE LOADS EQUALLY ON ATTACHMENTS AND TO ACHIEVE INDICATED SLOPE OF PIPE.
B. TRIM EXCESS LENGTH OF CONTINUOUS-THREAD HANGER AND SUPPORT RODS TO 1-1/2 INCHES.

3.6 HANGER AND SUPPORT SCHEDULE

A. SPECIFIC HANGER AND SUPPORT REQUIREMENTS ARE IN SECTIONS SPECIFYING PIPING SYSTEMS AND EQUIPMENT.
B. COMPLY WITH MSS SP-58 FOR PIPE-HANGER SELECTIONS AND APPLICATIONS THAT ARE NOT SPECIFIED IN PIPING SYSTEM SECTIONS.
C. USE HANGERS AND SUPPORTS WITH GALVANIZED METALLIC COATINGS FOR PIPING AND EQUIPMENT THAT WILL NOT HAVE FIELD-APPLIED FINISH.
D. USE NONMETALLIC COATINGS ON ATTACHMENTS FOR ELECTROLYTIC PROTECTION WHERE ATTACHMENTS ARE IN DIRECT CONTACT WITH COPPER TUBING.
E. USE CARBON-STEEL PIPE HANGERS AND SUPPORTS METAL TRAPEZE PIPE HANGERS AND METAL FRAMING SYSTEMS AND ATTACHMENTS FOR GENERAL SERVICE APPLICATIONS.
F. USE COPPER-PLATED PIPE HANGERS AND COPPER ATTACHMENTS FOR COPPER PIPING AND TUBING.
G. USE PADDED HANGERS FOR PIPING THAT IS SUBJECT TO SCRATCHING.
H. USE THERMAL-HANGER SHIELD INSERTS FOR INSULATED PIPING AND TUBING.
I. HORIZONTAL-PIPING HANGERS AND SUPPORTS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SECTIONS, INSTALL THE FOLLOWING TYPES:
1. ADJUSTABLE, STEEL CLEVIS HANGERS (MSS TYPE 1): FOR SUSPENSION OF NONINSULATED OR INSULATED, STATIONARY PIPES NPS 1/2 TO NPS 30.
2. YOKE-TYPE PIPE CLAMPS (MSS TYPE 2): FOR SUSPENSION OF UP TO 1050 DEG F, PIPES NPS 4 TO NPS 24, REQUIRING UP TO 4 INCHES OF INSULATION.
3. CARBON- OR ALLOY-STEEL, DOUBLE-BOLT PIPE CLAMPS (MSS TYPE 3): FOR SUSPENSION OF PIPES NPS 3/4 TO NPS 36, REQUIRING CLAMP FLEXIBILITY AND UP TO 4 INCHES OF INSULATION.
4. STEEL PIPE CLAMPS (MSS TYPE 4): FOR SUSPENSION OF COLD AND HOT PIPES NPS 1/2 TO NPS 24 IF LITTLE OR NO INSULATION IS REQUIRED.
5. PIPE HANGERS (MSS TYPE 5): FOR SUSPENSION OF PIPES NPS 1/2 TO NPS 4, TO ALLOW OFF-CENTER CLOSURE FOR HANGER INSTALLATION BEFORE PIPE ERECTION.
6. ADJUSTABLE, SWIVEL SPLIT- OR SOLID-RING HANGERS (MSS TYPE 6): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 3/4 TO NPS 8.
7. ADJUSTABLE, STEEL BAND HANGERS (MSS TYPE 7): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 1/2 TO NPS 8.
8. ADJUSTABLE BAND HANGERS (MSS TYPE 9): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 1/2 TO NPS 8.
9. ADJUSTABLE, SWIVEL-RING BAND HANGERS (MSS TYPE 10): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 1/2 TO NPS 8.
10. SPLIT PIPE RING WITH OR WITHOUT TURNBUCKLE HANGERS (MSS TYPE 11): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 3/8 TO NPS 8.
11. EXTENSION HINGED OR TWO-BOLT SPLIT PIPE CLAMPS (MSS TYPE 12): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 3/8 TO NPS 3.
12. U-BOLTS (MSS TYPE 24): FOR SUPPORT OF HEAVY PIPES NPS 1/2 TO NPS 30.
13. CLIPS (MSS TYPE 26): FOR SUPPORT OF INSULATED PIPES NOT SUBJECT TO EXPANSION OR CONTRACTION.
14. PIPE SADDLE SUPPORTS (MSS TYPE 36): FOR SUPPORT OF PIPES NPS 4 TO NPS 36, WITH STEEL-PIPE BASE STANCHION SUPPORT AND CAST-IRON FLOOR FLANGE OR CARBON-STEEL PLATE.
15. PIPE STANCHION SADDLES (MSS TYPE 37): FOR SUPPORT OF PIPES NPS 4 TO NPS 36, WITH STEEL-PIPE BASE STANCHION SUPPORT AND CAST-IRON FLOOR FLANGE OR CARBON-STEEL PLATE, AND WITH U-BOLT TO RETAIN PIPE.
16. ADJUSTABLE PIPE SADDLE SUPPORTS (MSS TYPE 38): FOR STANCHION-TYPE SUPPORT FOR PIPES NPS 2-1/2 TO NPS 36 IF VERTICAL ADJUSTMENT IS REQUIRED, WITH STEEL-PIPE BASE STANCHION SUPPORT AND CAST-IRON FLOOR FLANGE.
17. SINGLE-PIPE ROLLS (MSS TYPE 41): FOR SUSPENSION OF PIPES NPS 1 TO NPS 30, FROM TWO RODS IF LONGITUDINAL MOVEMENT CAUSED BY EXPANSION AND CONTRACTION MIGHT OCCUR.
18. ADJUSTABLE ROLLER HANGERS (MSS TYPE 43): FOR SUSPENSION OF PIPES NPS 2-1/2 TO NPS 24, FROM SINGLE ROD IF HORIZONTAL MOVEMENT CAUSED BY EXPANSION AND CONTRACTION MIGHT OCCUR.
19. COMPLETE PIPE ROLLS (MSS TYPE 44): FOR SUPPORT OF PIPES NPS 2 TO NPS 42 IF LONGITUDINAL MOVEMENT CAUSED BY EXPANSION AND CONTRACTION MIGHT OCCUR BUT VERTICAL ADJUSTMENT IS UNNECESSARY.
20. PIPE ROLL AND PLATE UNITS (MSS TYPE 45): FOR SUPPORT OF PIPES NPS 2 TO NPS 24 IF SMALL HORIZONTAL MOVEMENT CAUSED BY EXPANSION AND CONTRACTION MIGHT OCCUR AND VERTICAL ADJUSTMENT IS UNNECESSARY.
21. ADJUSTABLE PIPE ROLL AND BASE UNITS (MSS TYPE 46): FOR SUPPORT OF PIPES NPS 2 TO NPS 30 IF VERTICAL AND LATERAL ADJUSTMENT DURING INSTALLATION MIGHT BE REQUIRED IN ADDITION TO EXPANSION AND CONTRACTION.

J. SADDLES AND SHIELDS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SECTIONS, INSTALL THE FOLLOWING TYPES:
1. STEEL-PIPE-COVERING PROTECTION SADDLES (MSS TYPE 39): TO FILL INTERIOR VOIDS WITH INSULATION THAT MATCHES ADJOINING INSULATION.
2. PROTECTION SHIELDS (MSS TYPE 40): OF LENGTH RECOMMENDED IN WRITING BY MANUFACTURER TO PREVENT CRUSHING INSULATION.
3. THERMAL-HANGER SHIELD INSERTS: FOR SUPPORTING INSULATED PIPE.

K. COMPLY WITH MSS SP-58 FOR TRAPEZE PIPE-HANGER SELECTIONS AND APPLICATIONS THAT ARE NOT SPECIFIED IN PIPING SYSTEM SECTIONS.
L. COMPLY WITH MFMA-103 FOR METAL FRAMING SYSTEM SELECTIONS AND APPLICATIONS THAT ARE NOT SPECIFIED IN PIPING SYSTEM SECTIONS.

END OF SECTION 230529

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. EQUIPMENT LABELS.
2. WARNING SIGNS AND LABELS.
3. PIPE LABELS.
4. DUCT LABELS.
5. VALVE TAGS.
6. WARNING TAGS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.
B. EQUIPMENT LABEL SCHEDULE: INCLUDE A LISTING OF ALL EQUIPMENT TO BE LABELED WITH THE PROPOSED CONTENT FOR EACH LABEL.
C. VALVE NUMBERING SCHEME.
D. VALVE SCHEDULES: FOR EACH PIPING SYSTEM TO INCLUDE IN MAINTENANCE MANUALS.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. METAL LABELS FOR EQUIPMENT:
1. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   A. <u>CRAFTMARK PIPE MARKERS</u>.
   B. <u>SETON IDENTIFICATION PRODUCTS; A BRADY CORPORATION COMPANY</u>.
   C. OR APPROVED EQUAL
2. MATERIAL AND THICKNESS: BRASS, 0.032-INCH MINIMUM THICKNESS, AND HAVING PREDRILLED OR STAMPED HOLES FOR ATTACHMENT HARDWARE.
3. LETTER COLOR: BLACK.
4. BACKGROUND COLOR: WHITE.
5. MINIMUM LABEL SIZE: LENGTH AND WIDTH VARY FOR REQUIRED LABEL CONTENT, BUT NOT LESS THAN 2-1/2 BY 3/4 INCH.
6. MINIMUM LETTER SIZE: 1/4 INCH FOR NAME OF UNITS IF VIEWING DISTANCE IS LESS THAN 24 INCHES, 1/2 INCH FOR VIEWING DISTANCES UP TO 72 INCHES, AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-QUARTERS THE SIZE OF PRINCIPAL LETTERING.
7. FASTENERS: STAINLESS-STEEL RIVETS OR SELF-TAPPING SCREWS.
8. ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.

B. LABEL CONTENT: INCLUDE EQUIPMENT'S DRAWING DESIGNATION OR UNIQUE EQUIPMENT NUMBER, DRAWING NUMBERS WHERE EQUIPMENT IS INDICATED (PLANS, DETAILS, AND SCHEDULES), AND THE SPECIFICATION SECTION NUMBER AND TITLE WHERE EQUIPMENT IS SPECIFIED.
C. EQUIPMENT LABEL SCHEDULE: FOR EACH ITEM OF EQUIPMENT TO BE LABELED, ON 8-1/2-BY-11-INCH BOND PAPER. TABULATE EQUIPMENT IDENTIFICATION NUMBER, AND IDENTIFY DRAWING NUMBERS WHERE EQUIPMENT IS INDICATED (PLANS, DETAILS, AND SCHEDULES) AND THE SPECIFICATION SECTION NUMBER AND TITLE WHERE EQUIPMENT IS SPECIFIED. EQUIPMENT SCHEDULE SHALL BE INCLUDED IN OPERATION AND MAINTENANCE DATA.

2.2 WARNING SIGNS AND LABELS

A. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. <u>CRAFTMARK PIPE MARKERS</u>.
2. <u>SETON IDENTIFICATION PRODUCTS; A BRADY CORPORATION COMPANY</u>.
3. OR EQUAL

B. MATERIAL AND THICKNESS: MULTILAYER, MULTICOLOR, PLASTIC LABELS FOR MECHANICAL ENGRAVING, 1/8 INCH THICK, AND HAVING PREDRILLED HOLES FOR ATTACHMENT HARDWARE.
C. LETTER COLOR: RED.
D. BACKGROUND COLOR: WHITE.
E. MAXIMUM TEMPERATURE: ABLE TO WITHSTAND TEMPERATURES UP TO 160 DEG F.
F. MINIMUM LABEL SIZE: LENGTH AND WIDTH VARY FOR REQUIRED LABEL CONTENT, BUT NOT LESS THAN 2-1/2 BY 3/4 INCH.
G. MINIMUM LETTER SIZE: 1/4 INCH FOR NAME OF UNITS IF VIEWING DISTANCE IS LESS THAN 24 INCHES, 1/2 INCH FOR VIEWING DISTANCES UP TO 72 INCHES, AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-QUARTERS THE SIZE OF PRINCIPAL LETTERING.
H. FASTENERS: STAINLESS-STEEL RIVETS OR SELF-TAPPING SCREWS.
I. ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.

2.3 PIPE LABELS

A. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. <u>CRAFTMARK PIPE MARKERS</u>.
2. <u>SETON IDENTIFICATION PRODUCTS; A BRADY CORPORATION COMPANY</u>.
3. OR APPROVED EQUAL

B. GENERAL REQUIREMENTS FOR MANUFACTURED PIPE LABELS: PREPRINTED, COLOR-CODED, WITH LETTERING INDICATING SERVICE, AND SHOWING FLOW DIRECTION ACCORDING TO ASME A13.1.
C. PRETENSIONED PIPE LABELS: PRECOILED, SEMIRIGID PLASTIC FORMED TO COVER FULL CIRCUMFERENCE OF PIPE AND TO ATTACH TO PIPE WITHOUT FASTENERS OR ADHESIVE.
D. SELF-ADHESIVE PIPE LABELS: PRINTED PLASTIC WITH CONTACT-TYPE, PERMANENT-ADHESIVE BACKING.
E. PIPE LABEL CONTENTS: INCLUDE IDENTIFICATION OF PIPING SERVICE USING SAME DESIGNATIONS OR ABBREVIATIONS AS USED ON DRAWINGS; ALSO INCLUDE PIPE SIZE AND AN ARROW INDICATING FLOW DIRECTION.
1. FLOW-DIRECTION ARROWS: INTEGRAL WITH PIPING SYSTEM SERVICE LETTERING TO ACCOMMODATE BOTH DIRECTIONS OR AS SEPARATE UNIT ON EACH PIPE LABEL TO INDICATE FLOW DIRECTION.
2. LETTERING SIZE: SIZE LETTERS ACCORDING TO ASME A13.1 FOR PIPING.

2.4 DUCT LABELS

A. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. <u>CRAFTMARK PIPE MARKERS</u>.
2. <u>SETON IDENTIFICATION PRODUCTS; A BRADY CORPORATION COMPANY</u>.
3. OR APPROVED EQUAL

B. MATERIAL AND THICKNESS: MULTILAYER, MULTICOLOR, PLASTIC LABELS FOR MECHANICAL ENGRAVING, 1/8 INCH THICK, AND HAVING PREDRILLED HOLES FOR ATTACHMENT HARDWARE.
C. LETTER COLOR: BLACK.
D. BACKGROUND COLOR: WHITE.
E. MAXIMUM TEMPERATURE: ABLE TO WITHSTAND TEMPERATURES UP TO 160 DEG F.
F. MINIMUM LABEL SIZE: LENGTH AND WIDTH VARY FOR REQUIRED LABEL CONTENT, BUT NOT LESS THAN 2-1/2 BY 3/4 INCH.
G. MINIMUM LETTER SIZE: 1/4 INCH FOR NAME OF UNITS IF VIEWING DISTANCE IS LESS THAN 24 INCHES, 1/2 INCH FOR VIEWING DISTANCES UP TO 72 INCHES, AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-QUARTERS THE SIZE OF PRINCIPAL LETTERING.
H. FASTENERS: STAINLESS-STEEL RIVETS OR SELF-TAPPING SCREWS.
I. ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.
J. DUCT LABEL CONTENTS: INCLUDE IDENTIFICATION OF DUCT SERVICE USING SAME DESIGNATIONS OR ABBREVIATIONS AS USED ON DRAWINGS; ALSO INCLUDE DUCT SIZE AND AN ARROW INDICATING FLOW DIRECTION.
1. FLOW-DIRECTION ARROWS: INTEGRAL WITH DUCT SYSTEM SERVICE LETTERING TO ACCOMMODATE BOTH DIRECTIONS OR AS SEPARATE UNIT ON EACH DUCT LABEL TO INDICATE FLOW DIRECTION.

2.5 VALVE TAGS

A. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. <u>CRAFTMARK PIPE MARKERS</u>.
2. <u>SETON IDENTIFICATION PRODUCTS; A BRADY CORPORATION COMPANY</u>.
3. OR APPROVED EQUAL

B. DESCRIPTION: STAMPED OR ENGRAVED WITH 1/4-INCH LETTERS FOR PIPING SYSTEM ABBREVIATION AND 1/2-INCH NUMBERS.
1. TAG MATERIAL: BRASS, 0.032-INCH MINIMUM THICKNESS, AND HAVING PREDRILLED OR STAMPED HOLES FOR ATTACHMENT HARDWARE.
2. FASTENERS: BRASS WIRE-LINK CHAIN OR S-HOOK.

C. VALVE SCHEDULES: FOR EACH PIPING SYSTEM, ON 8-1/2-BY-11-INCH BOND PAPER. TABULATE VALVE NUMBER, PIPING SYSTEM, SYSTEM ABBREVIATION (AS SHOWN ON VALVE TAG), LOCATION OF VALVE (ROOM OR SPACE), NORMAL-OPERATING POSITION (OPEN, CLOSED, OR MODULATING), AND VARIATIONS FOR IDENTIFICATION. MARK VALVES FOR EMERGENCY SHUTOFF AND SIMILAR SPECIAL USES.
1. VALVE-TAG SCHEDULE SHALL BE INCLUDED IN OPERATION AND MAINTENANCE DATA.

2.6 WARNING TAGS

A. <u>MANUFACTURERS:</u> SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. <u>CRAFTMARK PIPE MARKERS</u>.
2. <u>SETON IDENTIFICATION PRODUCTS; A BRADY CORPORATION COMPANY</u>.
3. OR APPROVED EQUAL

B. DESCRIPTION: PREPRINTED OR PARTIALLY PREPRINTED ACCIDENT-PREVENTION TAGS OF PLASTICIZED CARD STOCK WITH MATTE FINISH SUITABLE FOR WRITING.
1. SIZE: 3 BY 5-1/4 INCHES MINIMUM.
2. FASTENERS: BRASS GROMMET AND WIRE.
3. NOMENCLATURE: LARGE-SIZE PRIMARY CAPTION SUCH AS "DANGER," "CAUTION," OR "DO NOT OPERATE."
4. COLOR: SAFETY-YELLOW BACKGROUND WITH BLACK LETTERING.

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PART 3 - EXECUTION

3.1 PREPARATION

A. CLEAN PIPING AND EQUIPMENT SURFACES OF SUBSTANCES THAT COULD IMPAIR BOND OF IDENTIFICATION DEVICES, INCLUDING DIRT, OIL, GREASE, RELEASE AGENTS, AND INCOMPATIBLE PRIMERS, PAINTS, AND ENCAPSULANTS.

3.2 EQUIPMENT LABEL INSTALLATION

A. INSTALL OR PERMANENTLY FASTEN LABELS ON EACH MAJOR ITEM OF MECHANICAL EQUIPMENT.
B. LOCATE EQUIPMENT LABELS WHERE ACCESSIBLE AND VISIBLE.

3.3 PIPE LABEL INSTALLATION

A. PIPE LABEL LOCATIONS: LOCATE PIPE LABELS WHERE PIPING IS EXPOSED OR ABOVE ACCESSIBLE CEILINGS IN FINISHED SPACES; MACHINE ROOMS; ACCESSIBLE MAINTENANCE SPACES SUCH AS SHAFTS, TUNNELS, AND PLENUMS; AND EXTERIOR EXPOSED LOCATIONS AS FOLLOWS:
1. NEAR EACH VALVE AND CONTROL DEVICE.
2. NEAR EACH BRANCH CONNECTION, EXCLUDING SHORT TAKEOFFS FOR FIXTURES AND TERMINAL UNITS. WHERE FLOW PATTERN IS NOT OBVIOUS, MARK EACH PIPE AT BRANCH.
3. NEAR PENETRATIONS AND ON BOTH SIDES OF THROUGH WALLS, FLOORS, CEILINGS, AND INACCESSIBLE ENCLOSURES.
4. AT ACCESS DOORS, MANHOLES, AND SIMILAR ACCESS POINTS THAT PERMIT VIEW OF CONCEALED PIPING.
5. NEAR MAJOR EQUIPMENT ITEMS AND OTHER POINTS OF ORIGINATION AND TERMINATION.
6. SPACED AT MAXIMUM INTERVALS OF 50 FEET ALONG EACH RUN. REDUCE INTERVALS TO 25 FEET IN AREAS OF CONGESTED PIPING AND EQUIPMENT.
7. ON PIPING ABOVE REMOVABLE ACOUSTICAL CEILINGS. OMIT INTERMEDIATELY SPACED LABELS.

B. DIRECTIONAL FLOW ARROWS: ARROWS SHALL BE USED TO INDICATE DIRECTION OF FLOW IN PIPES, INCLUDING PIPES WHERE FLOW IS ALLOWED IN BOTH DIRECTIONS.
C. PIPE LABEL COLOR SCHEDULE:
1. HEATING WATER PIPING: WHITE LETTERS ON A SAFETY-GREEN BACKGROUND.
2. REFRIGERANT PIPING: BLACK LETTERS ON A SAFETY-ORANGE BACKGROUND.

3.4 DUCT LABEL INSTALLATION

A. INSTALL PLASTIC-LAMINATED OR SELF-ADHESIVE DUCT LABELS WITH PERMANENT ADHESIVE ON AIR DUCTS IN THE SPECIFIC LABEL COLORS, TEXT, AND DIRECTIONAL FLOWS FOR EACH COMPONENT PART ARE DESCRIBED IN A SINGLE COMPREHENSIVE TABLE THAT IS CHAPTER 5, APPENDIX A, BUILDING SERVICES IDENTIFICATION LABELING. THIS LABELING SYSTEM MUST BE PART OF ANY CONSTRUCTION PROJECT, EVEN THOSE THAT ARE LIMITED TO A PORTION OF A BUILDING OR A SINGLE UTILITY SYSTEM.
B. LOCATE LABELS NEAR POINTS WHERE DUCTS ENTER INTO AND EXIT FROM CONCEALED SPACES AND AT MAXIMUM INTERVALS OF 50 FEET IN EACH SPACE WHERE DUCTS ARE EXPOSED OR CONCEALED BY REMOVABLE CEILING SYSTEM.

3.5 VALVE-TAG INSTALLATION

A. INSTALL TAGS ON VALVES AND CONTROL DEVICES IN PIPING SYSTEMS, EXCEPT CHECK VALVES, VALVES WITHIN FACTORY-FABRICATED EQUIPMENT UNITS, SHUTOFF VALVES, FAUCETS, CONVENIENCE AND LAWN-WATERING HOSE CONNECTIONS, AND HVAC TERMINAL DEVICES AND SIMILAR ROUGHING-IN CONNECTIONS OF END-USE FIXTURES AND UNITS. LIST TAGGED VALVES IN A VALVE SCHEDULE.
B. VALVE-TAG APPLICATION SCHEDULE: TAG VALVES ACCORDING TO SIZE, SHAPE, AND COLOR SCHEME AND WITH CAPTIONS SIMILAR TO THOSE INDICATED IN THE FOLLOWING SUBPARAGRAPHS:
1. VALVE-TAG SIZE AND SHAPE:
   A. REFRIGERANT: 1-1/2 INCHES, ROUND.
   B. HOT WATER: 1-1/2 INCHES, ROUND.

WARNING-TAG INSTALLATION

C. WRITE REQUIRED MESSAGE ON, AND ATTACH WARNING TAGS TO, EQUIPMENT AND OTHER ITEMS WHERE REQUIRED.

END OF SECTION 230553

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TOWN OF SANBORNTON · GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER – 10/20/2021

REVISIONS

SHEET TITLE:

SPECIFICATIONS

M5.2

SPECIFICATIONS M5.2

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

A. SECTION INCLUDES:
1. BALANCING AIR SYSTEMS:
A. CONSTANT-VOLUME AIR SYSTEMS.
2. BALANCING HYDRONIC PIPING SYSTEMS:
A. VARIABLE-FLOW HYDRONIC SYSTEMS.
3. TESTING, ADJUSTING, AND BALANCING EQUIPMENT:
A. HEAT EXCHANGERS.
B. MOTORS.
C. CONDENSING UNITS.
D. HEAT-TRANSFER COILS.

1.3 INFORMATIONAL SUBMITTALS

A. QUALIFICATION DATA: WITHIN 30 DAYS OF CONTRACTOR'S NOTICE TO PROCEED, SUBMIT DOCUMENTATION THAT THE TAB SPECIALIST AND THIS PROJECT'S TAB TEAM MEMBERS MEET THE QUALIFICATIONS SPECIFIED IN "QUALITY ASSURANCE" ARTICLE.
B. CONTRACT DOCUMENTS EXAMINATION REPORT: WITHIN 30 DAYS OF CONTRACTOR'S NOTICE TO PROCEED, SUBMIT THE CONTRACT DOCUMENTS REVIEW REPORT AS SPECIFIED IN PART 3.
C. STRATEGIES AND PROCEDURES PLAN: WITHIN 30 DAYS OF CONTRACTOR'S NOTICE TO PROCEED, SUBMIT TAB STRATEGIES AND STEP-BY-STEP PROCEDURES AS SPECIFIED IN "PREPARATION" ARTICLE.

1.4 QUALITY ASSURANCE

A. TAB SPECIALISTS QUALIFICATIONS: CERTIFIED BY AABC OR NEBB.
1. TAB FIELD SUPERVISOR: EMPLOYEE OF THE TAB SPECIALIST AND CERTIFIED BY AABC OR NEBB.
2. TAB TECHNICIAN: EMPLOYEE OF THE TAB SPECIALIST AND CERTIFIED BY AABC OR NEBB AS A TAB TECHNICIAN.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 EXAMINATION

A. EXAMINE THE CONTRACT DOCUMENTS TO BECOME FAMILIAR WITH PROJECT REQUIREMENTS AND TO DISCOVER CONDITIONS IN SYSTEMS DESIGNS THAT MAY PRECLUDE PROPER TAB OF SYSTEMS AND EQUIPMENT.
B. EXAMINE INSTALLED SYSTEMS FOR BALANCING DEVICES, SUCH AS TEST PORTS, GAGE COCKS, THERMOMETER WELLS, FLOW-CONTROL DEVICES, BALANCING VALVES AND FITTINGS, AND MANUAL VOLUME DAMPERS. VERIFY THAT LOCATIONS OF THESE BALANCING DEVICES ARE APPLICABLE FOR INTENDED PURPOSE AND ARE ACCESSIBLE.
C. EXAMINE THE APPROVED SUBMITTALS FOR HVAC SYSTEMS AND EQUIPMENT.
D. EXAMINE DESIGN DATA INCLUDING HVAC SYSTEM DESCRIPTIONS, STATEMENTS OF DESIGN ASSUMPTIONS FOR ENVIRONMENTAL CONDITIONS AND SYSTEMS OUTPUT, AND STATEMENTS OF PHILOSOPHIES AND ASSUMPTIONS ABOUT HVAC SYSTEM AND EQUIPMENT CONTROLS.
E. EXAMINE SYSTEM AND EQUIPMENT INSTALLATIONS AND VERIFY THAT FIELD QUALITY-CONTROL TESTING, CLEANING, AND ADJUSTING SPECIFIED IN INDIVIDUAL SECTIONS HAVE BEEN PERFORMED.
F. EXAMINE CONTROL VALVES FOR PROPER INSTALLATION FOR THEIR INTENDED FUNCTION OF THROTTLING, DIVERTING, OR MIXING FLUID FLOWS.
G. EXAMINE HEAT-TRANSFER COILS FOR CORRECT PIPING CONNECTIONS AND FOR CLEAN AND STRAIGHT FINS.
H. EXAMINE OPERATING SAFETY INTERLOCKS AND CONTROLS ON HVAC EQUIPMENT.
I. REPORT DEFICIENCIES DISCOVERED BEFORE AND DURING PERFORMANCE OF TAB PROCEDURES. OBSERVE AND RECORD SYSTEM REACTIONS TO CHANGES IN CONDITIONS. RECORD DEFAULT SET POINTS IF DIFFERENT FROM INDICATED VALUES.

3.2 PREPARATION

A. PREPARE A TAB PLAN THAT INCLUDES THE FOLLOWING:
1. EQUIPMENT AND SYSTEMS TO BE TESTED.
2. STRATEGIES AND STEP-BY-STEP PROCEDURES FOR BALANCING THE SYSTEMS.
3. INSTRUMENTATION TO BE USED.
4. SAMPLE FORMS WITH SPECIFIC IDENTIFICATION FOR ALL EQUIPMENT.

B. PERFORM SYSTEM-READINESS CHECKS OF HVAC SYSTEMS AND EQUIPMENT TO VERIFY SYSTEM READINESS FOR TAB WORK. INCLUDE, AT A MINIMUM, THE FOLLOWING:
1. AIRSIDE:
A. DUCT SYSTEMS ARE COMPLETE WITH TERMINALS INSTALLED.
B. VOLUME, SMOKE, AND FIRE DAMPERS ARE OPEN AND FUNCTIONAL.
C. CLEAN FILTERS ARE INSTALLED.
D. FANS ARE OPERATING, FREE OF VIBRATION, AND ROTATING IN CORRECT DIRECTION.
E. VARIABLE-FREQUENCY CONTROLLERS' STARTUP IS COMPLETE AND SAFETIES ARE VERIFIED.
F. AUTOMATIC TEMPERATURE-CONTROL SYSTEMS ARE OPERATIONAL.
G. CEILINGS ARE INSTALLED.
H. WINDOWS AND DOORS ARE INSTALLED.
I. SUITABLE ACCESS TO BALANCING DEVICES AND EQUIPMENT IS PROVIDED.
2. HYDRONICS:
A. VERIFY LEAKAGE AND PRESSURE TESTS ON WATER DISTRIBUTION SYSTEMS HAVE BEEN SATISFACTORILY COMPLETED.
B. PIPING IS COMPLETE WITH TERMINALS INSTALLED.
C. SYSTEMS ARE FLUSHED, FILLED, AND AIR PURGED.
D. CONTROL VALVES ARE FUNCTIONING PER THE SEQUENCE OF OPERATION.
E. SHUTOFF AND BALANCE VALVES HAVE BEEN VERIFIED TO BE 100 PERCENT OPEN.
F. SUITABLE ACCESS TO BALANCING DEVICES AND EQUIPMENT IS PROVIDED.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM ACCORDING TO THE PROCEDURES CONTAINED IN AABC'S "NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE" ASHRAE 111 NEBB'S "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS" SMACNA'S "HVAC SYSTEMS - TESTING, ADJUSTING, AND BALANCING" AND IN THIS SECTION.
B. CUT INSULATION, DUCTS, PIPES, AND EQUIPMENT CABINETS FOR INSTALLATION OF TEST PROBES TO THE MINIMUM EXTENT NECESSARY FOR TAB PROCEDURES.
1. AFTER TESTING AND BALANCING, PATCH PROBE HOLES IN DUCTS WITH SAME MATERIAL AND THICKNESS AS USED TO CONSTRUCT DUCTS.
C. MARK EQUIPMENT AND BALANCING DEVICES, INCLUDING DAMPER-CONTROL POSITIONS, VALVE POSITION INDICATORS, FAN-SPEED-CONTROL LEVERS, AND SIMILAR CONTROLS AND DEVICES, WITH PAINT OR OTHER SUITABLE, PERMANENT IDENTIFICATION MATERIAL TO SHOW FINAL SETTINGS.
D. TAKE AND REPORT TESTING AND BALANCING MEASUREMENTS IN INCH-POUND (IP) UNITS.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. PREPARE TEST REPORTS FOR BOTH FANS AND OUTLETS. OBTAIN MANUFACTURER'S OUTLET FACTORS AND RECOMMENDED TESTING PROCEDURES. CROSS-CHECK THE SUMMATION OF REQUIRED OUTLET VOLUMES WITH REQUIRED FAN VOLUMES.
B. LOCATE START-STOP AND DISCONNECT SWITCHES, ELECTRICAL INTERLOCKS, AND MOTOR STARTERS.
C. VERIFY THAT MOTOR STARTERS ARE EQUIPPED WITH PROPERLY SIZED THERMAL PROTECTION.
D. CHECK DAMPERS FOR PROPER POSITION TO ACHIEVE DESIRED AIRFLOW PATH.
E. CHECK FOR AIRFLOW BLOCKAGES.
F. CHECK CONDENSATE DRAINS FOR PROPER CONNECTIONS AND FUNCTIONING.
G. CHECK FOR PROPER SEALING OF AIR-HANDLING-UNIT COMPONENTS.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. ADJUST FANS TO DELIVER TOTAL INDICATED AIRFLOWS WITHIN THE MAXIMUM ALLOWABLE FAN SPEED LISTED BY FAN MANUFACTURER.
1. MEASURE TOTAL AIRFLOW.
A. SET OUTSIDE-AIR, RETURN-AIR, AND RELIEF-AIR DAMPERS FOR PROPER POSITION THAT SIMULATES MINIMUM OUTDOOR-AIR CONDITIONS.
B. WHERE DUCT CONDITIONS ALLOW, MEASURE AIRFLOW BY PITOT-TUBE TRAVERSE. IF NECESSARY, PERFORM MULTIPLE PITOT-TUBE TRAVERSES TO OBTAIN TOTAL AIRFLOW.
C. WHERE DUCT CONDITIONS ARE NOT SUITABLE FOR PITOT-TUBE TRAVERSE MEASUREMENTS, A COIL TRAVERSE MAY BE ACCEPTABLE.
D. IF A RELIABLE PITOT-TUBE TRAVERSE OR COIL TRAVERSE IS NOT POSSIBLE, MEASURE AIRFLOW AT TERMINALS AND CALCULATE THE TOTAL AIRFLOW.
2. MEASURE FAN STATIC PRESSURES AS FOLLOWS:
A. MEASURE STATIC PRESSURE DIRECTLY AT THE FAN OUTLET OR THROUGH THE FLEXIBLE CONNECTION.
B. MEASURE STATIC PRESSURE DIRECTLY AT THE FAN INLET OR THROUGH THE FLEXIBLE CONNECTION.
C. MEASURE STATIC PRESSURE ACROSS EACH COMPONENT THAT MAKES UP THE AIR-HANDLING SYSTEM.
D. REPORT ARTIFICIAL LOADING OF FILTERS AT THE TIME STATIC PRESSURES ARE MEASURED.
3. REVIEW RECORD DOCUMENTS TO DETERMINE VARIATIONS IN DESIGN STATIC PRESSURES VERSUS ACTUAL STATIC PRESSURES. CALCULATE ACTUAL SYSTEM-EFFECT FACTORS. RECOMMEND ADJUSTMENTS TO ACCOMMODATE ACTUAL CONDITIONS.
4. OBTAIN APPROVAL FROM CONSTRUCTION MANAGER FOR ADJUSTMENT OF FAN SPEED HIGHER OR LOWER THAN INDICATED SPEED. COMPLY WITH REQUIREMENTS IN HVAC SECTIONS FOR AIR-HANDLING UNITS FOR ADJUSTMENT OF FANS, BELTS, AND PULLEY SIZES TO ACHIEVE INDICATED AIR-HANDLING-UNIT PERFORMANCE.
5. DO NOT MAKE FAN-SPEED ADJUSTMENTS THAT RESULT IN MOTOR OVERLOAD. CONSULT EQUIPMENT MANUFACTURERS ABOUT FAN-SPEED SAFETY FACTORS. MODULATE DAMPERS AND MEASURE FAN-MOTOR AMPERAGE TO ENSURE THAT NO OVERLOAD OCCURS. MEASURE AMPERAGE IN FULL-COOLING, FULL-HEATING, ECONOMIZER, AND ANY OTHER OPERATING MODE TO DETERMINE THE MAXIMUM REQUIRED BRAKE HORSEPOWER.

B. ADJUST VOLUME DAMPERS FOR MAIN DUCT, SUBMAIN DUCTS, AND MAJOR BRANCH DUCTS TO INDICATED AIRFLOWS.
1. MEASURE AIRFLOW OF SUBMAIN AND BRANCH DUCTS.
2. ADJUST SUBMAIN AND BRANCH DUCT VOLUME DAMPERS FOR SPECIFIED AIRFLOW.
3. RE-MEASURE EACH SUBMAIN AND BRANCH DUCT AFTER ALL HAVE BEEN ADJUSTED.

C. ADJUST AIR INLETS AND OUTLETS FOR EACH SPACE TO INDICATED AIRFLOWS.
1. SET AIRFLOW PATTERNS OF ADJUSTABLE OUTLETS FOR PROPER DISTRIBUTION WITHOUT DRAFTS.
2. MEASURE INLETS AND OUTLETS AIRFLOW.
3. ADJUST EACH INLET AND OUTLET FOR SPECIFIED AIRFLOW.
4. RE-MEASURE EACH INLET AND OUTLET AFTER THEY HAVE BEEN ADJUSTED.

D. VERIFY FINAL SYSTEM CONDITIONS.
1. RE-MEASURE AND CONFIRM THAT MINIMUM OUTDOOR, RETURN, AND RELIEF AIRFLOWS ARE WITHIN DESIGN. READJUST TO DESIGN IF NECESSARY.
2. RE-MEASURE AND CONFIRM THAT TOTAL AIRFLOW IS WITHIN DESIGN.
3. RE-MEASURE ALL FINAL FAN OPERATING DATA, RPMS, VOLTS, AMPS, AND STATIC PROFILE.
4. MARK ALL FINAL SETTINGS.
5. TEST SYSTEM IN ECONOMIZER MODE. VERIFY PROPER OPERATION AND ADJUST IF NECESSARY.
6. MEASURE AND RECORD ALL OPERATING DATA.
7. RECORD FINAL FAN-PERFORMANCE DATA.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. PREPARE TEST REPORTS FOR PUMPS, COILS, AND HEAT EXCHANGERS. OBTAIN APPROVED SUBMITTALS AND MANUFACTURER-RECOMMENDED TESTING PROCEDURES. CROSSCHECK THE SUMMATION OF REQUIRED COIL AND HEAT EXCHANGER FLOW RATES WITH PUMP DESIGN FLOW RATE.
B. PREPARE SCHEMATIC DIAGRAMS OF SYSTEMS' "AS-BUILT" PIPING LAYOUTS.
C. IN ADDITION TO REQUIREMENTS IN "PREPARATION" ARTICLE, PREPARE HYDRONIC SYSTEMS FOR TESTING AND BALANCING AS FOLLOWS:
1. CHECK LIQUID LEVEL IN EXPANSION TANK.
2. CHECK HIGHEST VENT FOR ADEQUATE PRESSURE.
3. CHECK FLOW-CONTROL VALVES FOR PROPER POSITION.
4. LOCATE START-STOP AND DISCONNECT SWITCHES, ELECTRICAL INTERLOCKS, AND MOTOR STARTERS.
5. VERIFY THAT MOTOR STARTERS ARE EQUIPPED WITH PROPERLY SIZED THERMAL PROTECTION.
6. CHECK THAT AIR HAS BEEN PURGED FROM THE SYSTEM.

3.7 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. BALANCE SYSTEMS WITH AUTOMATIC TWO- AND THREE-WAY CONTROL VALVES BY SETTING SYSTEMS AT MAXIMUM FLOW THROUGH HEAT-EXCHANGE TERMINALS, AND PROCEED AS SPECIFIED ABOVE FOR HYDRONIC SYSTEMS.
B. ADJUST THE VARIABLE-FLOW HYDRONIC SYSTEM AS FOLLOWS:
1. VERIFY THAT THE DIFFERENTIAL-PRESSURE SENSOR IS LOCATED AS INDICATED.
2. DETERMINE WHETHER THERE IS DIVERSITY IN THE SYSTEM.
C. FOR SYSTEMS WITH NO DIVERSITY:
1. ADJUST FLOW-MEASURING DEVICES INSTALLED IN MAINS AND BRANCHES TO DESIGN WATER FLOWS.
A. MEASURE FLOW IN MAIN AND BRANCH PIPES.
B. ADJUST MAIN AND BRANCH BALANCE VALVES FOR DESIGN FLOW.
C. RE-MEASURE EACH MAIN AND BRANCH AFTER ALL HAVE BEEN ADJUSTED.
2. ADJUST FLOW-MEASURING DEVICES INSTALLED AT TERMINALS FOR EACH SPACE TO DESIGN WATER FLOWS.
A. MEASURE FLOW AT TERMINALS.
B. ADJUST EACH TERMINAL TO DESIGN FLOW.
C. RE-MEASURE EACH TERMINAL AFTER IT IS ADJUSTED.
D. POSITION CONTROL VALVES TO BYPASS THE COIL AND ADJUST THE BYPASS VALVE TO MAINTAIN DESIGN FLOW.
E. PERFORM TEMPERATURE TESTS AFTER FLOWS HAVE BEEN BALANCED.
3. FOR SYSTEMS WITH PRESSURE-INDEPENDENT VALVES AT TERMINALS:
A. MEASURE DIFFERENTIAL PRESSURE AND VERIFY THAT IT IS WITHIN MANUFACTURER'S SPECIFIED RANGE.
B. PERFORM TEMPERATURE TESTS AFTER FLOWS HAVE BEEN VERIFIED.
4. FOR SYSTEMS WITHOUT PRESSURE-INDEPENDENT VALVES OR FLOW-MEASURING DEVICES AT TERMINALS:
A. MEASURE AND BALANCE COILS BY EITHER COIL PRESSURE DROP OR TEMPERATURE METHOD.
B. IF BALANCED BY COIL PRESSURE DROP, PERFORM TEMPERATURE TESTS AFTER FLOWS HAVE BEEN VERIFIED.
5. PRIOR TO VERIFYING FINAL SYSTEM CONDITIONS, DETERMINE THE SYSTEM DIFFERENTIAL-PRESSURE SET POINT.
6. MARK FINAL SETTINGS AND VERIFY THAT ALL MEMORY STOPS HAVE BEEN SET.
7. VERIFY FINAL SYSTEM CONDITIONS AS FOLLOWS:
A. RE-MEASURE AND CONFIRM THAT TOTAL WATER FLOW IS WITHIN DESIGN.
B. RE-MEASURE FINAL PUMPS' OPERATING DATA, TDH, VOLTS, AMPS, AND STATIC PROFILE.
C. MARK FINAL SETTINGS.
8. VERIFY THAT MEMORY STOPS HAVE BEEN SET.
D. FOR SYSTEMS WITH DIVERSITY:
1. DETERMINE DIVERSITY FACTOR.
2. SIMULATE SYSTEM DIVERSITY BY CLOSING REQUIRED NUMBER OF CONTROL VALVES, AS APPROVED BY THE DESIGN ENGINEER.
3. ADJUST PUMPS TO DELIVER TOTAL DESIGN GPM.
A. MEASURE TOTAL WATER FLOW.
1) POSITION VALVES FOR FULL FLOW THROUGH COILS.
2) MEASURE FLOW BY MAIN FLOW METER, IF INSTALLED.
3) IF MAIN FLOW METER IS NOT INSTALLED, DETERMINE FLOW BY PUMP TDH OR EXCHANGER PRESSURE DROP.
B. MEASURE PUMP TDH AS FOLLOWS:
1) MEASURE DISCHARGE PRESSURE DIRECTLY AT THE PUMP OUTLET FLANGE OR IN DISCHARGE PIPE PRIOR TO ANY VALVES.
2) MEASURE INLET PRESSURE DIRECTLY AT THE PUMP INLET FLANGE OR IN SUCTION PIPE PRIOR TO ANY VALVES OR STRAINERS.
3) CONVERT PRESSURE TO HEAD AND CORRECT FOR DIFFERENCES IN GAGE HEIGHTS.
4) VERIFY PUMP IMPELLER SIZE BY MEASURING THE TDH WITH THE DISCHARGE VALVE CLOSED. NOTE THE POINT ON MANUFACTURER'S PUMP CURVE AT ZERO FLOW AND VERIFY THAT THE PUMP HAS THE INTENDED IMPELLER SIZE.
5) WITH VALVES OPEN, READ PUMP TDH. ADJUST PUMP DISCHARGE VALVE UNTIL DESIGN WATER FLOW IS ACHIEVED.
C. MONITOR MOTOR PERFORMANCE DURING PROCEDURES AND DO NOT OPERATE MOTOR IN AN OVERLOADED CONDITION.
4. ADJUST FLOW-MEASURING DEVICES INSTALLED IN MAINS AND BRANCHES TO DESIGN WATER FLOWS.
A. MEASURE FLOW IN MAIN AND BRANCH PIPES.
B. ADJUST MAIN AND BRANCH BALANCE VALVES FOR DESIGN FLOW.
C. RE-MEASURE EACH MAIN AND BRANCH AFTER ALL HAVE BEEN ADJUSTED.
5. ADJUST FLOW-MEASURING DEVICES INSTALLED AT TERMINALS FOR EACH SPACE TO DESIGN WATER FLOWS.
A. MEASURE FLOW AT TERMINALS.
B. ADJUST EACH TERMINAL TO DESIGN FLOW.
C. RE-MEASURE EACH TERMINAL AFTER IT IS ADJUSTED.
D. POSITION CONTROL VALVES TO BYPASS THE COIL, AND ADJUST THE BYPASS VALVE TO MAINTAIN DESIGN FLOW.
E. PERFORM TEMPERATURE TESTS AFTER FLOWS HAVE BEEN BALANCED.
6. FOR SYSTEMS WITH PRESSURE-INDEPENDENT VALVES AT TERMINALS:
A. MEASURE DIFFERENTIAL PRESSURE, AND VERIFY THAT IT IS WITHIN MANUFACTURER'S SPECIFIED RANGE.
B. PERFORM TEMPERATURE TESTS AFTER FLOWS HAVE BEEN VERIFIED.
7. FOR SYSTEMS WITHOUT PRESSURE-INDEPENDENT VALVES OR FLOW-MEASURING DEVICES AT TERMINALS:
A. MEASURE AND BALANCE COILS BY EITHER COIL PRESSURE DROP OR TEMPERATURE METHOD.
B. IF BALANCED BY COIL PRESSURE DROP, PERFORM TEMPERATURE TESTS AFTER FLOWS HAVE BEEN VERIFIED.
8. OPEN CONTROL VALVES THAT WERE SHUT. CLOSE A SUFFICIENT NUMBER OF CONTROL VALVES THAT WERE PREVIOUSLY OPEN TO MAINTAIN DIVERSITY, AND BALANCE TERMINALS THAT WERE JUST OPENED.
9. PRIOR TO VERIFYING FINAL SYSTEM CONDITIONS, DETERMINE SYSTEM DIFFERENTIAL-PRESSURE SET POINT.
10. IF THE PUMP DISCHARGE VALVE WAS USED TO SET TOTAL SYSTEM FLOW WITH VARIABLE-FREQUENCY CONTROLLER AT 60 HZ, AT COMPLETION OPEN DISCHARGE VALVE 100 PERCENT AND ALLOW VARIABLE-FREQUENCY CONTROLLER TO CONTROL SYSTEM DIFFERENTIAL-PRESSURE SET POINT. RECORD PUMP DATA UNDER BOTH CONDITIONS.
11. MARK FINAL SETTINGS AND VERIFY THAT MEMORY STOPS HAVE BEEN SET.
12. VERIFY FINAL SYSTEM CONDITIONS AS FOLLOWS:
A. RE-MEASURE AND CONFIRM THAT TOTAL WATER FLOW IS WITHIN DESIGN.
B. RE-MEASURE FINAL PUMPS' OPERATING DATA, TDH, VOLTS, AMPS, AND STATIC PROFILE.
C. MARK FINAL SETTINGS.
13. VERIFY THAT MEMORY STOPS HAVE BEEN SET.

3.8 PROCEDURES FOR MOTORS

A. MOTORS 1/2 HP AND LARGER: TEST AT FINAL BALANCED CONDITIONS AND RECORD THE FOLLOWING DATA:
1. MANUFACTURER'S NAME, MODEL NUMBER, AND SERIAL NUMBER.
2. MOTOR HORSEPOWER RATING.
3. MOTOR RPM.
4. PHASE AND HERTZ.
5. NAMEPLATE AND MEASURED VOLTAGE, EACH PHASE.
6. NAMEPLATE AND MEASURED AMPERAGE, EACH PHASE.
7. STARTER SIZE AND THERMAL-PROTECTION-ELEMENT RATING.
8. SERVICE FACTOR AND FRAME SIZE.
B. MOTORS DRIVEN BY VARIABLE-FREQUENCY CONTROLLERS: TEST MANUAL BYPASS OF CONTROLLER TO PROVE PROPER OPERATION.

3.9 PROCEDURES FOR CONDENSING UNITS

A. VERIFY PROPER ROTATION OF FANS.
B. MEASURE ENTERING- AND LEAVING-AIR TEMPERATURES.
C. RECORD FAN AND MOTOR OPERATING DATA.

3.10 TOLERANCES

A. SET HVAC SYSTEM'S AIRFLOW RATES AND WATER FLOW RATES WITHIN THE FOLLOWING TOLERANCES:
1. SUPPLY, RETURN, AND EXHAUST FANS AND EQUIPMENT WITH FANS: PLUS OR MINUS 10 PERCENT.
2. AIR OUTLETS AND INLETS: PLUS OR MINUS 10 PERCENT.
3. HEATING-WATER FLOW RATE: PLUS OR MINUS 10 PERCENT.
B. MAINTAINING PRESSURE RELATIONSHIPS AS DESIGNED SHALL HAVE PRIORITY OVER THE TOLERANCES SPECIFIED ABOVE.

3.11 PROGRESS REPORTING

A. INITIAL CONSTRUCTION-PHASE REPORT: BASED ON EXAMINATION OF THE CONTRACT DOCUMENTS AS SPECIFIED IN "EXAMINATION" ARTICLE, PREPARE A REPORT ON THE ADEQUACY OF DESIGN FOR SYSTEMS BALANCING DEVICES. RECOMMEND CHANGES AND ADDITIONS TO SYSTEMS BALANCING DEVICES TO FACILITATE PROPER PERFORMANCE MEASURING AND BALANCING. RECOMMEND CHANGES AND ADDITIONS TO HVAC SYSTEMS AND GENERAL CONSTRUCTION TO ALLOW ACCESS FOR PERFORMANCE MEASURING AND BALANCING DEVICES.
B. STATUS REPORTS: PREPARE BIWEEKLY PROGRESS REPORTS TO DESCRIBE COMPLETED PROCEDURES, PROCEDURES IN PROGRESS, AND SCHEDULED PROCEDURES. INCLUDE A LIST OF DEFICIENCIES AND PROBLEMS FOUND IN SYSTEMS BEING TESTED AND BALANCED. PREPARE A SEPARATE REPORT FOR EACH SYSTEM AND EACH BUILDING FLOOR FOR SYSTEMS SERVING MULTIPLE FLOORS.

3.12 FINAL REPORT

A. GENERAL: PREPARE A CERTIFIED WRITTEN REPORT; TABULATE AND DIVIDE THE REPORT INTO SEPARATE SECTIONS FOR TESTED SYSTEMS AND BALANCED SYSTEMS.
1. INCLUDE A CERTIFICATION SHEET AT THE FRONT OF THE REPORT'S BINDER, SIGNED AND SEALED BY THE CERTIFIED TESTING AND BALANCING ENGINEER.
2. INCLUDE A LIST OF INSTRUMENTS USED FOR PROCEDURES, ALONG WITH PROOF OF CALIBRATION.
3. CERTIFY VALIDITY AND ACCURACY OF FIELD DATA.
B. FINAL REPORT CONTENTS: IN ADDITION TO CERTIFIED FIELD-REPORT DATA, INCLUDE THE FOLLOWING:
1. FAN CURVES.
2. MANUFACTURERS' TEST DATA.
3. FIELD TEST REPORTS PREPARED BY SYSTEM AND EQUIPMENT INSTALLERS.
4. OTHER INFORMATION RELATIVE TO EQUIPMENT PERFORMANCE; DO NOT INCLUDE SHOP DRAWINGS AND PRODUCT DATA.
C. GENERAL REPORT DATA: IN ADDITION TO FORM TITLES AND ENTRIES, INCLUDE THE FOLLOWING DATA:
1. TITLE PAGE.
2. NAME AND ADDRESS OF THE TAB SPECIALIST.
3. PROJECT NAME.
4. PROJECT LOCATION.
5. ARCHITECT'S NAME AND ADDRESS.
6. ENGINEER'S NAME AND ADDRESS.
7. CONTRACTOR'S NAME AND ADDRESS.
8. REPORT DATE.
9. SIGNATURE OF TAB SUPERVISOR WHO CERTIFIES THE REPORT.
10. TABLE OF CONTENTS WITH THE TOTAL NUMBER OF PAGES DEFINED FOR EACH SECTION OF THE REPORT. NUMBER EACH PAGE IN THE REPORT.
11. SUMMARY OF CONTENTS INCLUDING THE FOLLOWING:
A. INDICATED VERSUS FINAL PERFORMANCE.
B. NOTABLE CHARACTERISTICS OF SYSTEMS.
C. DESCRIPTION OF SYSTEM OPERATION SEQUENCE IF IT VARIES FROM THE CONTRACT DOCUMENTS.
12. NOMENCLATURE SHEETS FOR EACH ITEM OF EQUIPMENT.
13. DATA FOR TERMINAL UNITS, INCLUDING MANUFACTURER'S NAME, TYPE, SIZE, AND FITTINGS.
14. NOTES TO EXPLAIN WHY CERTAIN FINAL DATA IN THE BODY OF REPORTS VARY FROM INDICATED VALUES.
15. TEST CONDITIONS FOR FANS AND PUMP PERFORMANCE FORMS INCLUDING THE FOLLOWING:
A. SETTINGS FOR OUTDOOR-, RETURN-, AND EXHAUST-AIR DAMPERS.
B. CONDITIONS OF FILTERS.
C. COOLING COIL, WET- AND DRY-BULB CONDITIONS.
D. FACE AND BYPASS DAMPER SETTINGS AT COILS.
E. FAN DRIVE SETTINGS INCLUDING SETTINGS AND PERCENTAGE OF MAXIMUM PITCH DIAMETER.
F. INLET VANE SETTINGS FOR VARIABLE-AIR-VOLUME SYSTEMS.
G. SETTINGS FOR SUPPLY-AIR, STATIC-PRESSURE CONTROLLER.
H. OTHER SYSTEM OPERATING CONDITIONS THAT AFFECT PERFORMANCE.
D. SYSTEM DIAGRAMS: INCLUDE SCHEMATIC LAYOUTS OF AIR AND HYDRONIC DISTRIBUTION SYSTEMS. PRESENT EACH SYSTEM WITH SINGLE-LINE DIAGRAM AND INCLUDE THE FOLLOWING:
1. QUANTITIES OF OUTDOOR, SUPPLY, RETURN, AND EXHAUST AIRFLOWS.
2. WATER AND STEAM FLOW RATES.
3. DUCT, OUTLET, AND INLET SIZES.
4. PIPE AND VALVE SIZES AND LOCATIONS.
5. TERMINAL UNITS.
6. BALANCING STATIONS.
7. POSITION OF BALANCING DEVICES.
E. FAN TEST REPORTS: FOR SUPPLY, RETURN, AND EXHAUST FANS, INCLUDE THE FOLLOWING:
1. FAN DATA:
A. SYSTEM IDENTIFICATION.
B. LOCATION.
C. MAKE AND TYPE.
D. MODEL NUMBER AND SIZE.
E. MANUFACTURER'S SERIAL NUMBER.
F. ARRANGEMENT AND CLASS.
G. SHEAVE MAKE, SIZE IN INCHES, AND BORE.
H. CENTER-TO-CENTER DIMENSIONS OF SHEAVE AND AMOUNT OF ADJUSTMENTS IN INCHES.
2. MOTOR DATA:
A. MOTOR MAKE, AND FRAME TYPE AND SIZE.
B. HORSEPOWER AND RPM.
C. VOLTS, PHASE, AND HERTZ.
D. FULL-LOAD AMPERAGE AND SERVICE FACTOR.
E. SHEAVE MAKE, SIZE IN INCHES, AND BORE.
F. CENTER-TO-CENTER DIMENSIONS OF SHEAVE, AND AMOUNT OF ADJUSTMENTS IN INCHES.
G. NUMBER, MAKE, AND SIZE OF BELTS.
3. TEST DATA (INDICATED AND ACTUAL VALUES):
A. TOTAL AIRFLOW RATE IN CFM.
B. TOTAL SYSTEM STATIC PRESSURE IN INCHES WG.
C. FAN RPM.
D. DISCHARGE STATIC PRESSURE IN INCHES WG.
E. SUCTION STATIC PRESSURE IN INCHES WG.
F. ROUND, FLAT-OVAL, AND RECTANGULAR DUCT TRAVERSE REPORTS: INCLUDE A DIAGRAM WITH A GRID REPRESENTING THE DUCT CROSS-SECTION AND RECORD THE FOLLOWING:
1. REPORT DATA:
A. SYSTEM AND AIR-HANDLING-UNIT NUMBER.
B. LOCATION AND ZONE.
C. TRAVERSE AIR TEMPERATURE IN DEG F.
D. DUCT STATIC PRESSURE IN INCHES WG.
E. DUCT SIZE IN INCHES.
F. DUCT AREA IN SQ. FT..
G. INDICATED AIRFLOW RATE IN CFM.
H. INDICATED VELOCITY IN FPM.
I. ACTUAL AIRFLOW RATE IN CFM.
J. ACTUAL AVERAGE VELOCITY IN FPM.
K. BAROMETRIC PRESSURE IN PSIG.
G. AIR-TERMINAL-DEVICE REPORTS:
1. UNIT DATA:
A. SYSTEM AND AIR-HANDLING UNIT IDENTIFICATION.
B. LOCATION AND ZONE.
C. APPARATUS USED FOR TEST.
D. AREA SERVED.
E. MAKE.
F. NUMBER FROM SYSTEM DIAGRAM.
G. TYPE AND MODEL NUMBER.
H. SIZE.
I. EFFECTIVE AREA IN SQ. FT..
2. TEST DATA (INDICATED AND ACTUAL VALUES):
A. AIRFLOW RATE IN CFM.
B. AIR VELOCITY IN FPM.
C. PRELIMINARY AIRFLOW RATE AS NEEDED IN CFM.
D. PRELIMINARY VELOCITY AS NEEDED IN FPM.
E. FINAL AIRFLOW RATE IN CFM.
F. FINAL VELOCITY IN FPM.
G. SPACE TEMPERATURE IN DEG F.
H. INSTRUMENT CALIBRATION REPORTS:
1. REPORT DATA:
A. INSTRUMENT TYPE AND MAKE.
B. SERIAL NUMBER.
C. APPLICATION.
D. DATES OF USE.
E. DATES OF CALIBRATION.

3.13 VERIFICATION OF TAB REPORT

A. THE TAB SPECIALIST'S TEST AND BALANCE ENGINEER SHALL CONDUCT THE INSPECTION IN THE PRESENCE OF CONSTRUCTION MANAGER.
B. CONSTRUCTION MANAGER SHALL RANDOMLY SELECT MEASUREMENTS, DOCUMENTED IN THE FINAL REPORT, TO BE RECHECKED. RECHECKING SHALL BE LIMITED TO EITHER 10 PERCENT OF THE TOTAL MEASUREMENTS RECORDED OR THE EXTENT OF MEASUREMENTS THAT CAN BE ACCOMPLISHED IN A NORMAL 8-HOUR BUSINESS DAY.
C. IF RECHECKS YIELD MEASUREMENTS THAT DIFFER FROM THE MEASUREMENTS DOCUMENTED IN THE FINAL REPORT BY MORE THAN THE TOLERANCES ALLOWED, THE MEASUREMENTS SHALL BE NOTED AS "FAILED."
D. IF THE NUMBER OF "FAILED" MEASUREMENTS IS GREATER THAN 10 PERCENT OF THE TOTAL MEASUREMENTS CHECKED DURING THE FINAL INSPECTION, THE TESTING AND BALANCING SHALL BE CONSIDERED INCOMPLETE AND SHALL BE REJECTED.
E. IF TAB WORK FAILS, PROCEED AS FOLLOWS:
1. TAB SPECIALISTS SHALL RECHECK ALL MEASUREMENTS AND MAKE ADJUSTMENTS. REVISE THE FINAL REPORT AND BALANCING DEVICE SETTINGS TO INCLUDE ALL CHANGES; RESUBMIT THE FINAL REPORT AND REQUEST A SECOND FINAL INSPECTION.
2. IF THE SECOND FINAL INSPECTION ALSO FAILS, OWNER MAY CONTRACT THE SERVICES OF ANOTHER TAB SPECIALIST TO COMPLETE TAB WORK ACCORDING TO THE CONTRACT DOCUMENTS AND DEDUCT THE COST OF THE SERVICES FROM THE ORIGINAL TAB SPECIALIST'S FINAL PAYMENT.
F. PREPARE TEST AND INSPECTION REPORTS.

END OF SECTION 230593

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KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

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REVISIONS

SHEET TITLE:
SPECIFICATIONS

M5.3

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY
A. SECTION INCLUDES INSULATING THE FOLLOWING DUCT SERVICES:
1. INDOOR, CONCEALED SUPPLY, RETURN AND OUTDOOR AIR.
2. INDOOR, CONCEALED OUTDOOR AIR.

1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED. INCLUDE THERMAL CONDUCTIVITY, WATER-VAPOR PERMEANCE THICKNESS, AND JACKETS (BOTH FACTORY- AND FIELD-APPLIED IF ANY).

1.3 QUALITY ASSURANCE
A. INSTALLER QUALIFICATIONS: SKILLED MECHANICS WHO HAVE SUCCESSFULLY COMPLETED AN APPRENTICESHIP PROGRAM OR ANOTHER CRAFT TRAINING PROGRAM CERTIFIED BY THE DEPARTMENT OF LABOR, BUREAU OF APPRENTICESHIP AND TRAINING.
B. SURFACE-BURNING CHARACTERISTICS: FOR INSULATION AND RELATED MATERIALS, AS DETERMINED BY TESTING IDENTICAL PRODUCTS ACCORDING TO ASTM E 84, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION. FACTORY LABEL INSULATION AND JACKET MATERIALS AND ADHESIVE, MASTIC, TAPES, AND CEMENT MATERIAL CONTAINERS, WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.
1. INSULATION INSTALLED INDOORS: FLAME-SPREAD INDEX OF 25 OR LESS, AND SMOKE-DEVELOPED INDEX OF 50 OR LESS.
2. INSULATION INSTALLED OUTDOORS: FLAME-SPREAD INDEX OF 75 OR LESS, AND SMOKE-DEVELOPED INDEX OF 150 OR LESS.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS
A. COMPLY WITH REQUIREMENTS IN "DUCT INSULATION SCHEDULE, GENERAL," "INDOOR DUCT AND PLENUM INSULATION SCHEDULE," AND "ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE" ARTICLES FOR WHERE INSULATING MATERIALS SHALL BE APPLIED.
B. PRODUCTS SHALL NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS.
C. FLEXIBLE ELASTOMERIC INSULATION: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534, TYPE II FOR SHEET MATERIALS.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. AEROFLEX USA.
B. ARMACELL LLC.
C. K-FLEX USA.
D. MINERAL-FIBER BLANKET INSULATION: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II AND ASTM C 1290, TYPE I WITH FACTORY-APPLIED FSK JACKET. FACTORY-APPLIED JACKET REQUIREMENTS ARE SPECIFIED IN "FACTORY-APPLIED JACKETS" ARTICLE.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. JOHNS MANVILLE; A BERKSHIRE HATHAWAY COMPANY.
B. KNAUF INSULATION.
C. MANSON INSULATION INC.
D. OWENS CORNING.

2.2 ADHESIVES
A. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES AND FOR BONDING INSULATION TO ITSELF AND TO SURFACES TO BE INSULATED UNLESS OTHERWISE INDICATED.
B. FLEXIBLE ELASTOMERIC AND POLYOLEFIN ADHESIVE: COMPLY WITH MIL-A-24179A, TYPE II, CLASS I.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. AEROFLEX USA.
B. ARMACELL LLC.
C. FOSTER BRAND; H. B. FULLER CONSTRUCTION PRODUCTS.
D. K-FLEX USA.
C. MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. CHILDERS BRAND; H. B. FULLER CONSTRUCTION PRODUCTS.
B. EAGLE BRIDGES - MARATHON INDUSTRIES.
C. FOSTER BRAND; H. B. FULLER CONSTRUCTION PRODUCTS.
D. MON-ECO INDUSTRIES, INC.
D. FSK JACKET ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A FOR BONDING INSULATION JACKET LAP SEAMS AND JOINTS.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. CHILDERS BRAND; H. B. FULLER CONSTRUCTION PRODUCTS.
B. EAGLE BRIDGES - MARATHON INDUSTRIES.
C. FOSTER BRAND; H. B. FULLER CONSTRUCTION PRODUCTS.
D. MON-ECO INDUSTRIES, INC.

2.3 SEALANTS
A. FSK AND METAL JACKET FLASHING SEALANTS:
1. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.
2. FIRE- AND WATER-RESISTANT, FLEXIBLE, ELASTOMERIC SEALANT.
3. SERVICE TEMPERATURE RANGE: MINUS 40 TO PLUS 250 DEG F.
4. COLOR: ALUMINUM.

2.4 FACTORY-APPLIED JACKETS
A. INSULATION SYSTEM SCHEDULES INDICATE FACTORY-APPLIED JACKETS ON VARIOUS APPLICATIONS. WHEN FACTORY-APPLIED JACKETS ARE INDICATED, COMPLY WITH THE FOLLOWING:
1. FSK JACKET: ALUMINUM-FOIL, FIBERGLASS-REINFORCED SCRIM WITH KRAFT-PAPER BACKING; COMPLYING WITH ASTM C 1136, TYPE II.

2.5 TAPES
A. FSK TAPE: FOIL-FACE, VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE; COMPLYING WITH ASTM C 1136.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. AVERY DENNISON CORPORATION, SPECIALTY TAPES DIVISION.
B. IDEAL TAPE CO., INC., AN AMERICAN BILTRITE COMPANY.
C. KNAUF INSULATION.
2. WIDTH: 3 INCHES.
3. THICKNESS: 6.5 MILS.
4. ADHESION: 90 OUNCES FORCE/INCH IN WIDTH.
5. ELONGATION: 2 PERCENT.
6. TENSILE STRENGTH: 40 LBF/INCH IN WIDTH.
7. FSK TAPE DISKS AND SQUARES: PRECUT DISKS OR SQUARES OF FSK TAPE.

2.6 SECUREMENTS
A. BANDS:
1. STAINLESS STEEL: ASTM A 167 OR ASTM A 240/A 240M, TYPE 304; 0.015 INCH THICK, 1/2 INCH WIDE WITH WING SEAL OR CLOSED SEAL.
2. ALUMINUM: ASTM B 209, ALLOY 3003, 3005, 3105, OR 5005; TEMPER H-14, 0.020 INCH THICK, 1/2 INCH WIDE WITH WING SEAL OR CLOSED SEAL.
B. INSULATION PINS AND HANGERS:
1. CAPACITOR-DISCHARGE-WELD PINS: COPPER- OR ZINC-COATED STEEL PIN, FULLY ANNEALED FOR CAPACITOR-DISCHARGE WELDING, 0.106-INCH-DIAMETER SHANK, LENGTH TO SUIT DEPTH OF INSULATION INDICATED.
2. CUPPED-HEAD, CAPACITOR-DISCHARGE-WELD PINS: COPPER- OR ZINC-COATED STEEL PIN, FULLY ANNEALED FOR CAPACITOR-DISCHARGE WELDING, 0.106-INCH-DIAMETER SHANK, LENGTH TO SUIT DEPTH OF INSULATION INDICATED WITH INTEGRAL 1-1/2-INCH GALVANIZED CARBON-STEEL WASHER.

PART 3 - EXECUTION

3.1 EXAMINATION
A. EXAMINE SUBSTRATES AND CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF INSULATION APPLICATION.
1. VERIFY THAT SYSTEMS TO BE INSULATED HAVE BEEN TESTED AND ARE FREE OF DEFECTS.
2. VERIFY THAT SURFACES TO BE INSULATED ARE CLEAN AND DRY.
B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 PREPARATION
A. SURFACE PREPARATION: CLEAN AND DRY SURFACES TO RECEIVE INSULATION. REMOVE MATERIALS THAT WILL ADVERSELY AFFECT INSULATION APPLICATION.

3.3 GENERAL INSTALLATION REQUIREMENTS
A. INSTALL INSULATION MATERIALS, ACCESSORIES, AND FINISHES WITH SMOOTH, STRAIGHT, AND EVEN SURFACES; FREE OF VOIDS THROUGHOUT THE LENGTH OF DUCTS AND FITTINGS.
B. INSTALL INSULATION MATERIALS, VAPOR BARRIERS OR RETARDERS, JACKETS, AND THICKNESSES REQUIRED FOR EACH ITEM OF DUCT SYSTEM AS SPECIFIED IN INSULATION SYSTEM SCHEDULES.
C. INSTALL ACCESSORIES COMPATIBLE WITH INSULATION MATERIALS AND SUITABLE FOR THE SERVICE. INSTALL ACCESSORIES THAT DO NOT CORRODE, SOFTEN, OR OTHERWISE ATTACK INSULATION OR JACKET IN EITHER WET OR DRY STATE.
D. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT TOP AND BOTTOM OF HORIZONTAL RUNS.
E. INSTALL MULTIPLE LAYERS OF INSULATION WITH LONGITUDINAL AND END SEAMS STAGGERED.
F. KEEP INSULATION MATERIALS DRY DURING APPLICATION AND FINISHING.
G. INSTALL INSULATION WITH TIGHT LONGITUDINAL SEAMS AND END JOINTS. BOND SEAMS AND JOINTS WITH ADHESIVE RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
H. INSTALL INSULATION WITH LEAST NUMBER OF JOINTS PRACTICAL.
I. WHERE VAPOR BARRIER IS INDICATED, SEAL JOINTS, SEAMS, AND PENETRATIONS IN INSULATION AT HANGERS, SUPPORTS, ANCHORS, AND OTHER PROJECTIONS WITH VAPOR-BARRIER MASTIC.
1. INSTALL INSULATION CONTINUOUSLY THROUGH HANGERS AND AROUND ANCHOR ATTACHMENTS.
2. FOR INSULATION APPLICATION WHERE VAPOR BARRIERS ARE INDICATED, EXTEND INSULATION ON ANCHOR LEGS FROM POINT OF ATTACHMENT TO SUPPORTED ITEM TO POINT OF ATTACHMENT TO STRUCTURE. TAPER AND SEAL ENDS AT ATTACHMENT TO STRUCTURE WITH VAPOR-BARRIER MASTIC.
3. INSTALL INSERT MATERIALS AND INSTALL INSULATION TO TIGHTLY JOIN THE INSERT. SEAL INSULATION TO INSULATION INSERTS WITH ADHESIVE OR SEALING COMPOUND RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
J. APPLY ADHESIVES, MASTICS, AND SEALANTS AT MANUFACTURER'S RECOMMENDED COVERAGE RATE AND WET AND DRY FILM THICKNESSES.
K. INSTALL INSULATION WITH FACTORY-APPLIED JACKETS AS FOLLOWS:
1. DRAW JACKET TIGHT AND SMOOTH.
2. COVER CIRCUMFERENTIAL JOINTS WITH 3-INCH-WIDE STRIPS, OF SAME MATERIAL AS INSULATION JACKET. SECURE STRIPS WITH ADHESIVE AND OUTWARD CLINCHING STAPLES ALONG BOTH EDGES OF STRIP, SPACED 4 INCHES O.C.
3. OVERLAP JACKET LONGITUDINAL SEAMS AT LEAST 1-1/2 INCHES. CLEAN AND DRY SURFACE TO RECEIVE SELF-SEALING LAP. STAPLE LAPS WITH OUTWARD CLINCHING STAPLES ALONG EDGE AT 2 INCHES O.C.
A. FOR BELOW AMBIENT SERVICES, APPLY VAPOR-BARRIER MASTIC OVER STAPLES.
4. COVER JOINTS AND SEAMS WITH TAPE, ACCORDING TO INSULATION MATERIAL MANUFACTURER'S WRITTEN INSTRUCTIONS, TO MAINTAIN VAPOR SEAL.
5. WHERE VAPOR BARRIERS ARE INDICATED, APPLY VAPOR-BARRIER MASTIC ON SEAMS AND JOINTS AND AT ENDS ADJACENT TO DUCT FLANGES AND FITTINGS.
L. CUT INSULATION IN A MANNER TO AVOID COMPRESSING INSULATION MORE THAN 75 PERCENT OF ITS NOMINAL THICKNESS.
M. FINISH INSTALLATION WITH SYSTEMS AT OPERATING CONDITIONS. REPAIR JOINT SEPARATIONS AND CRACKING DUE TO THERMAL MOVEMENT.
N. REPAIR DAMAGED INSULATION FACINGS BY APPLYING SAME FACING MATERIAL OVER DAMAGED AREAS. EXTEND PATCHES AT LEAST 4 INCHES BEYOND DAMAGED AREAS. ADHERE, STAPLE, AND SEAL PATCHES SIMILAR TO BUTT JOINTS.

3.4 PENETRATIONS
A. INSULATION INSTALLATION AT ROOF OR ATTIC PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH ROOF PENETRATIONS.
1. SEAL PENETRATIONS WITH FLASHING SEALANT.
B. INSULATION INSTALLATION AT INTERIOR WALL AND PARTITION PENETRATIONS (THAT ARE NOT FIRE RATED): INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION
A. SEAL LONGITUDINAL SEAMS AND END JOINTS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION
A. BLANKET INSULATION INSTALLATION ON DUCTS AND PLENUMS: SECURE WITH ADHESIVE AND INSULATION PINS.
1. APPLY ADHESIVES ACCORDING TO MANUFACTURER'S RECOMMENDED COVERAGE RATES PER UNIT AREA, FOR 100 PERCENT COVERAGE OF DUCT AND PLENUM SURFACES.
2. APPLY ADHESIVE TO ENTIRE CIRCUMFERENCE OF DUCTS AND TO ALL SURFACES OF FITTINGS AND TRANSITIONS.
3. INSTALL EITHER CAPACITOR-DISCHARGE-WELD PINS AND SPEED WASHERS OR CUPPED-HEAD, CAPACITOR-DISCHARGE-WELD PINS ON SIDES AND BOTTOM OF HORIZONTAL DUCTS AND SIDES OF VERTICAL DUCTS AS FOLLOWS:
A. ON DUCT SIDES WITH DIMENSIONS 18 INCHES AND SMALLER, PLACE PINS ALONG LONGITUDINAL CENTERLINE OF DUCT. SPACE 3 INCHES MAXIMUM FROM INSULATION END JOINTS, AND 16 INCHES O.C.
B. ON DUCT SIDES WITH DIMENSIONS LARGER THAN 18 INCHES, PLACE PINS 16 INCHES O.C. EACH WAY, AND 3 INCHES MAXIMUM FROM INSULATION JOINTS. INSTALL ADDITIONAL PINS TO HOLD INSULATION TIGHTLY AGAINST SURFACE AT CROSS BRACING.
C. PINS MAY BE OMITTED FROM TOP SURFACE OF HORIZONTAL, RECTANGULAR DUCTS AND PLENUMS.
D. DO NOT OVERCOMPRESS INSULATION DURING INSTALLATION.
E. IMPALE INSULATION OVER PINS AND ATTACH SPEED WASHERS.
F. CUT EXCESS PORTION OF PINS EXTENDING BEYOND SPEED WASHERS OR BEND PARALLEL WITH INSULATION SURFACE. COVER EXPOSED PINS AND WASHERS WITH TAPE MATCHING INSULATION FACING.
4. FOR DUCTS AND PLENUMS WITH SURFACE TEMPERATURES BELOW AMBIENT, INSTALL A CONTINUOUS UNBROKEN VAPOR BARRIER. CREATE A FACING LAP FOR LONGITUDINAL SEAMS AND END JOINTS WITH INSULATION BY REMOVING 2 INCHES FROM ONE EDGE AND ONE END OF INSULATION SEGMENT. SECURE LAPS TO ADJACENT INSULATION SECTION WITH 1/2-INCH OUTWARD-CLINCHING STAPLES, 1 INCH O.C. INSTALL VAPOR BARRIER CONSISTING OF FACTORY- OR FIELD-APPLIED JACKET, ADHESIVE, VAPOR-BARRIER MASTIC, AND SEALANT AT JOINTS, SEAMS, AND PROTRUSIONS.
A. REPAIR PUNCTURES, TEARS, AND PENETRATIONS WITH TAPE OR MASTIC TO MAINTAIN VAPOR-BARRIER SEAL.
B. INSTALL VAPOR STOPS FOR DUCTWORK AND PLENUMS OPERATING BELOW 50 DEG F AT 18-FOOT INTERVALS. VAPOR STOPS SHALL CONSIST OF VAPOR-BARRIER MASTIC APPLIED IN A Z-SHAPED PATTERN OVER INSULATION FACE, ALONG BUTT END OF INSULATION, AND OVER THE SURFACE. COVER INSULATION FACE AND SURFACE TO BE INSULATED A WIDTH EQUAL TO TWO TIMES THE INSULATION THICKNESS, BUT NOT LESS THAN 3 INCHES.
5. OVERLAP UNFACED BLANKETS A MINIMUM OF 2 INCHES ON LONGITUDINAL SEAMS AND END JOINTS. AT END JOINTS, SECURE WITH STEEL BANDS SPACED A MAXIMUM OF 18 INCHES O.C.
6. INSTALL INSULATION ON RECTANGULAR DUCT ELBOWS AND TRANSITIONS WITH A FULL INSULATION SECTION FOR EACH SURFACE. INSTALL INSULATION ON ROUND AND FLAT-OVAL DUCT ELBOWS WITH INDIVIDUALLY MITERED GORES CUT TO FIT THE ELBOW.
7. INSULATE DUCT STIFFENERS, HANGERS, AND FLANGES THAT PROTRUDE BEYOND INSULATION SURFACE WITH 6-INCH-WIDE STRIPS OF SAME MATERIAL USED TO INSULATE DUCT. SECURE ON ALTERNATING SIDES OF STIFFENER, HANGER, AND FLANGE WITH PINS SPACED 6 INCHES O.C.

3.7 FIELD-APPLIED JACKET INSTALLATION
A. WHERE FSK JACKETS ARE INDICATED, INSTALL AS FOLLOWS:
1. DRAW JACKET MATERIAL SMOOTH AND TIGHT.
2. INSTALL LAP OR JOINT STRIPS WITH SAME MATERIAL AS JACKET.
3. SECURE JACKET TO INSULATION WITH MANUFACTURER'S RECOMMENDED ADHESIVE.
4. INSTALL JACKET WITH 1-1/2-INCH LAPS AT LONGITUDINAL SEAMS AND 3-INCH-WIDE JOINT STRIPS AT END JOINTS.
5. SEAL OPENINGS, PUNCTURES, AND BREAKS IN VAPOR-RETARDER JACKETS AND EXPOSED INSULATION WITH VAPOR-BARRIER MASTIC.

3.8 FIELD QUALITY CONTROL
A. PERFORM TESTS AND INSPECTIONS.
B. TESTS AND INSPECTIONS:
1. INSPECT DUCTWORK, RANDOMLY SELECTED BY ARCHITECT, BY REMOVING FIELD-APPLIED JACKET AND INSULATION IN LAYERS IN REVERSE ORDER OF THEIR INSTALLATION. EXTENT OF INSPECTION SHALL BE LIMITED TO ONE LOCATION(S) FOR EACH DUCT SYSTEM DEFINED IN THE "DUCT INSULATION SCHEDULE, GENERAL" ARTICLE.
C. ALL INSULATION APPLICATIONS WILL BE CONSIDERED DEFECTIVE WORK IF SAMPLE INSPECTION REVEALS NONCOMPLIANCE WITH REQUIREMENTS.

3.9 INDOOR DUCT AND PLENUM INSULATION SCHEDULE
A. CONCEALED OR EXPOSED BELOW THE ROOF STRUCTURE (BELOW THE ATTIC), RECTANGULAR, ROUND AND FLAT-OVAL, SUPPLY-AIR, RETURN AIR, EXHAUST AIR OR OUTSIDE AIR DUCT INSULATION SHALL BE ONE OF THE FOLLOWING:
1. FLEXIBLE ELASTOMERIC: 2 INCH THICK. MINIMUM OF R-6 INSTALLED.
2. MINERAL-FIBER BLANKET WITH FSK JACKET: 2 INCHES THICK AND 0.75-LB/CU. FT. NOMINAL DENSITY. MINIMUM OF R-6 INSTALLED.
B. CONCEALED WITHIN THE ROOF STRUCTURE SPACE (IN THE ATTIC), RECTANGULAR, ROUND AND FLAT-OVAL, EXHAUST-AIR OR OUTSIDE AIR DUCT INSULATION SHALL BE ONE OF THE FOLLOWING:
1. MINERAL-FIBER BLANKET WITH FSK JACKET: 3 INCHES AND 1.5-LB/CU. FT. NOMINAL DENSITY MINIMUM OF R-12 INSTALLED.

END OF SECTION 230713

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY
A. SECTION INCLUDES INSULATING THE FOLLOWING HVAC PIPING SYSTEMS:
1. CONDENSATE DRAIN PIPING, INDOORS.
2. HEATING HOT-WATER PIPING, INDOORS.
3. REFRIGERANT SUCTION AND HOT-GAS PIPING, INDOORS AND OUTDOORS.

1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED. INCLUDE THERMAL CONDUCTIVITY, WATER-VAPOR PERMEANCE THICKNESS, AND JACKETS (BOTH FACTORY AND FIELD APPLIED IF ANY).

1.3 QUALITY ASSURANCE
A. INSTALLER QUALIFICATIONS: SKILLED MECHANICS WHO HAVE SUCCESSFULLY COMPLETED AN APPRENTICESHIP PROGRAM OR ANOTHER CRAFT TRAINING PROGRAM CERTIFIED BY THE DEPARTMENT OF LABOR, BUREAU OF APPRENTICESHIP AND TRAINING.
B. SURFACE-BURNING CHARACTERISTICS: FOR INSULATION AND RELATED MATERIALS, AS DETERMINED BY TESTING IDENTICAL PRODUCTS ACCORDING TO ASTM E 84, BY A TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION. FACTORY LABEL INSULATION AND JACKET MATERIALS AND ADHESIVE, MASTIC, TAPES, AND CEMENT MATERIAL CONTAINERS, WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.
1. INSULATION INSTALLED INDOORS: FLAME-SPREAD INDEX OF 25 OR LESS, AND SMOKE-DEVELOPED INDEX OF 50 OR LESS.
2. INSULATION INSTALLED OUTDOORS: FLAME-SPREAD INDEX OF 75 OR LESS, AND SMOKE-DEVELOPED INDEX OF 150 OR LESS.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS
A. COMPLY WITH REQUIREMENTS IN "PIPING INSULATION SCHEDULE, GENERAL," "INDOOR PIPING INSULATION SCHEDULE," "OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE," FOR WHERE INSULATING MATERIALS SHALL BE APPLIED.
B. PRODUCTS SHALL NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS.
C. FLEXIBLE ELASTOMERIC INSULATION: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIALS. COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. AEROFLEX USA.
B. ARMACELL LLC.
C. K-FLEX USA.
D. MINERAL-FIBER, PREFORMED PIPE INSULATION:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. JOHNS MANVILLE; A BERKSHIRE HATHAWAY COMPANY.
B. KNAUF INSULATION.
C. MANSON INSULATION INC.
D. OWENS CORNING.
2. TYPE I, 850 DEG F MATERIALS: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 547, TYPE I, GRADE A, WITH FACTORY-APPLIED ASJ. FACTORY-APPLIED JACKET REQUIREMENTS ARE SPECIFIED IN "FACTORY-APPLIED JACKETS" ARTICLE.

2.2 INSULATING CEMENTS
A. MINERAL-FIBER INSULATING CEMENT: COMPLY WITH ASTM C 195.

2.3 ADHESIVES
A. FLEXIBLE ELASTOMERIC ADHESIVE: COMPLY WITH MIL-A-24179A, TYPE II, CLASS I.
B. MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A.

2.4 SEALANTS
A. ASJ FLASHING SEALANTS:
1. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.
2. FIRE- AND WATER-RESISTANT, FLEXIBLE, ELASTOMERIC SEALANT.
3. SERVICE TEMPERATURE RANGE: MINUS 40 TO PLUS 250 DEG F.
4. COLOR: WHITE.

2.5 FACTORY-APPLIED JACKETS
A. INSULATION SYSTEM SCHEDULES INDICATE FACTORY-APPLIED JACKETS ON VARIOUS APPLICATIONS. WHEN FACTORY-APPLIED JACKETS ARE INDICATED, COMPLY WITH THE FOLLOWING:
1. ASJ: WHITE, KRAFT-PAPER, FIBERGLASS-REINFORCED SCRIM WITH ALUMINUM-FOIL BACKING; COMPLYING WITH ASTM C 1136, TYPE I.

2.6 TAPES
A. ASJ TAPE: WHITE VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE, COMPLYING WITH ASTM C 1136.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. 3M INDUSTRIAL ADHESIVES AND TAPES DIVISION.
B. AVERY DENNISON CORPORATION, SPECIALTY TAPES DIVISION.
C. IDEAL TAPE CO., INC., AN AMERICAN BILTRITE COMPANY.
D. KNAUF INSULATION.
2. WIDTH: 3 INCHES.
3. THICKNESS: 11.5 MILS.
4. ADHESION: 90 OUNCES FORCE/INCH IN WIDTH.
5. ELONGATION: 2 PERCENT.
6. TENSILE STRENGTH: 40 LBF/INCH IN WIDTH.
7. ASJ TAPE DISKS AND SQUARES: PRECUT DISKS OR SQUARES OF ASJ TAPE.

2.7 SECUREMENTS
A. BANDS:
1. STAINLESS STEEL: ASTM A 167 OR ASTM A 240/A 240M, TYPE 304; 0.015 INCH THICK, 1/2 INCH WIDE WITH WING SEAL OR CLOSED SEAL.
2. ALUMINUM: ASTM B 209, ALLOY 3003, 3005, 3105, OR 5005; TEMPER H-14, 0.020 INCH THICK, 1/2 INCH WIDE WITH WING SEAL OR CLOSED SEAL.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS
A. INSTALL INSULATION MATERIALS, ACCESSORIES, AND FINISHES WITH SMOOTH, STRAIGHT, AND EVEN SURFACES; FREE OF VOIDS THROUGHOUT THE LENGTH OF PIPING INCLUDING FITTINGS, VALVES, AND SPECIALTIES.
B. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT TOP AND BOTTOM OF HORIZONTAL RUNS.
C. INSTALL MULTIPLE LAYERS OF INSULATION WITH LONGITUDINAL AND END SEAMS STAGGERED.
D. INSTALL INSULATION WITH TIGHT LONGITUDINAL SEAMS AND END JOINTS. BOND SEAMS AND JOINTS WITH ADHESIVE RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
E. APPLY ADHESIVES, MASTICS, AND SEALANTS AT MANUFACTURER'S RECOMMENDED COVERAGE RATE AND WET AND DRY FILM THICKNESSES.
F. INSTALL INSULATION WITH FACTORY-APPLIED JACKETS AS FOLLOWS:
1. DRAW JACKET TIGHT AND SMOOTH.
2. COVER CIRCUMFERENTIAL JOINTS WITH 3-INCH- WIDE STRIPS, OF SAME MATERIAL AS INSULATION JACKET. SECURE STRIPS WITH ADHESIVE AND OUTWARD CLINCHING STAPLES ALONG BOTH EDGES OF STRIP, SPACED 4 INCHES O.C.
3. OVERLAP JACKET LONGITUDINAL SEAMS AT LEAST 1-1/2 INCHES. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT BOTTOM OF PIPE. CLEAN AND DRY SURFACE TO RECEIVE SELF-SEALING LAP. STAPLE LAPS WITH OUTWARD CLINCHING STAPLES ALONG EDGE AT 2 INCHES O.C.
4. COVER JOINTS AND SEAMS WITH TAPE, ACCORDING TO INSULATION MATERIAL MANUFACTURER'S WRITTEN INSTRUCTIONS, TO MAINTAIN VAPOR SEAL.
5. WHERE VAPOR BARRIERS ARE INDICATED, APPLY VAPOR-BARRIER MASTIC ON SEAMS AND

3.2 PENETRATIONS
A. INSULATION INSTALLATION AT ABOVEGROUND EXTERIOR WALL PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH WALL PENETRATIONS.
1. SEAL PENETRATIONS WITH FLASHING SEALANT.
2. FOR APPLICATIONS REQUIRING ONLY INDOOR INSULATION, TERMINATE INSULATION INSIDE WALL SURFACE AND SEAL WITH JOINT SEALANT. FOR APPLICATIONS REQUIRING INDOOR AND OUTDOOR INSULATION, INSTALL INSULATION FOR OUTDOOR APPLICATIONS TIGHTLY JOINED TO INDOOR INSULATION ENDS. SEAL JOINT WITH JOINT SEALANT.
3. EXTEND JACKET OF OUTDOOR INSULATION OUTSIDE WALL FLASHING AND OVERLAP WALL FLASHING AT LEAST 2 INCHES.
4. SEAL JACKET TO WALL FLASHING WITH FLASHING SEALANT.
B. INSULATION INSTALLATION AT INTERIOR WALL AND PARTITION PENETRATIONS (THAT ARE NOT FIRE RATED): INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.

3.3 GENERAL PIPE INSULATION INSTALLATION
A. REQUIREMENTS IN THIS ARTICLE GENERALLY APPLY TO ALL INSULATION MATERIALS EXCEPT WHERE MORE SPECIFIC REQUIREMENTS ARE SPECIFIED IN VARIOUS PIPE INSULATION MATERIAL INSTALLATION ARTICLES.
B. INSULATION INSTALLATION ON FITTINGS, VALVES, STRAINERS, FLANGES, AND UNIONS:
1. INSTALL INSULATION OVER FITTINGS, VALVES, STRAINERS, FLANGES, UNIONS, AND OTHER SPECIALTIES WITH CONTINUOUS THERMAL AND VAPOR-RETARDER INTEGRITY UNLESS OTHERWISE INDICATED.
2. INSULATE PIPE ELBOWS USING PREFORMED FITTING INSULATION OR MITERED FITTINGS MADE FROM SAME MATERIAL AND DENSITY AS ADJACENT PIPE INSULATION. EACH PIECE SHALL BE BUTTED TIGHTLY AGAINST ADJOINING PIECE AND BONDED WITH ADHESIVE. FILL JOINTS, SEAMS, VOIDS, AND IRREGULAR SURFACES WITH INSULATING CEMENT FINISHED TO A SMOOTH, HARD, AND UNIFORM CONTOUR THAT IS UNIFORM WITH ADJOINING PIPE INSULATION.
3. INSULATE TEE FITTINGS WITH PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL AND THICKNESS AS USED FOR ADJACENT PIPE. CUT SECTIONAL PIPE INSULATION TO FIT. BUTT EACH SECTION CLOSELY TO THE NEXT AND HOLD IN PLACE WITH TIE WIRE. BOND PIECES WITH ADHESIVE.
4. INSULATE VALVES USING PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL, DENSITY, AND THICKNESS AS USED FOR ADJACENT PIPE. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER. FOR VALVES, INSULATE UP TO AND INCLUDING THE BONNETS, VALVE STUFFING-BOX STUDS, BOLTS, AND NUTS. FILL JOINTS, SEAMS, AND IRREGULAR SURFACES WITH INSULATING CEMENT.
5. INSULATE STRAINERS USING PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL, DENSITY, AND THICKNESS AS USED FOR ADJACENT PIPE. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER. FILL JOINTS, SEAMS, AND IRREGULAR SURFACES WITH INSULATING CEMENT. INSULATE STRAINERS SO STRAINER BASKET FLANGE OR PLUG CAN BE EASILY REMOVED AND REPLACED WITHOUT DAMAGING THE INSULATION AND JACKET. PROVIDE A REMOVABLE REUSABLE INSULATION COVER. FOR BELOW-AMBIENT SERVICES, PROVIDE A DESIGN THAT MAINTAINS VAPOR BARRIER.
6. INSULATE FLANGES AND UNIONS USING A SECTION OF OVERSIZED PREFORMED PIPE INSULATION. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER.
7. COVER SEGMENTED INSULATED SURFACES WITH A LAYER OF FINISHING CEMENT AND COAT WITH A MASTIC. INSTALL VAPOR-BARRIER MASTIC FOR BELOW-AMBIENT SERVICES AND A BREATHER MASTIC FOR ABOVE-AMBIENT SERVICES. REINFORCE THE MASTIC WITH FABRIC-REINFORCING MESH. TROWEL THE MASTIC TO A SMOOTH AND WELL-SHAPED CONTOUR.
8. FOR SERVICES NOT SPECIFIED TO RECEIVE A FIELD-APPLIED JACKET EXCEPT FOR FLEXIBLE ELASTOMERIC AND POLYOLEFIN, INSTALL FITTED PVC COVER OVER ELBOWS, TEES, STRAINERS, VALVES, FLANGES, AND UNIONS. TERMINATE ENDS WITH PVC END CAPS. TAPE PVC COVERS TO ADJOINING INSULATION FACING USING PVC TAPE.
9. STENCIL OR LABEL THE OUTSIDE INSULATION JACKET OF EACH UNION WITH THE WORD "UNION." MATCH SIZE AND COLOR OF PIPE LABELS.
C. INSULATE INSTRUMENT CONNECTIONS FOR THERMOMETERS, PRESSURE GAGES, PRESSURE TEMPERATURE TAPS, TEST CONNECTIONS, FLOW METERS, SENSORS, SWITCHES, AND TRANSMITTERS ON INSULATED PIPES. SHAPE INSULATION AT THESE CONNECTIONS BY TAPERING IT TO AND AROUND THE CONNECTION WITH INSULATING CEMENT AND FINISH WITH FINISHING CEMENT, MASTIC, AND FLASHING SEALANT.

3.4 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION
A. SEAL LONGITUDINAL SEAMS AND END JOINTS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.
B. INSULATION INSTALLATION ON PIPE FLANGES:
1. INSTALL PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.
2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.
3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH CUT SECTIONS OF SHEET INSULATION OF SAME THICKNESS AS PIPE INSULATION.
4. SECURE INSULATION TO FLANGES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.
C. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS:
1. INSTALL MITERED SECTIONS OF PIPE INSULATION.
2. SECURE INSULATION MATERIALS AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.
D. INSULATION INSTALLATION ON VALVES AND PIPE SPECIALTIES:
1. INSTALL PREFORMED VALVE COVERS MANUFACTURED OF SAME MATERIAL AS PIPE INSULATION WHEN AVAILABLE.
2. WHEN PREFORMED VALVE COVERS ARE NOT AVAILABLE, INSTALL CUT SECTIONS OF PIPE AND SHEET INSULATION TO VALVE BODY. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.
3. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR FLANGE INSULATION APPLICATION.
4. SECURE INSULATION TO VALVES AND SPECIALTIES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

3.5 INSTALLATION OF MINERAL-FIBER INSULATION
A. INSULATION INSTALLATION ON STRAIGHT PIPES AND TUBES:
1. SECURE EACH LAYER OF PREFORMED PIPE INSULATION TO PIPE WITH WIRE OR BANDS AND TIGHTEN BANDS WITHOUT DEFORMING INSULATION MATERIALS.
2. WHERE VAPOR BARRIERS ARE INDICATED, SEAL LONGITUDINAL SEAMS, END JOINTS, AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT.
3. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON ABOVE-AMBIENT SURFACES, SECURE LAPS WITH OUTWARD-CLINCHED STAPLES AT 6 INCHES O.C.
4. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON BELOW-AMBIENT SURFACES, DO NOT STAPLE LONGITUDINAL TABS. INSTEAD, SECURE TABS WITH ADDITIONAL ADHESIVE AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER AND SEAL WITH VAPOR-BARRIER MASTIC AND FLASHING SEALANT.
B. INSULATION INSTALLATION ON PIPE FLANGES:
1. INSTALL PREFORMED PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.
2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.
3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH MINERAL-FIBER BLANKET INSULATION.
4. INSTALL JACKET MATERIAL WITH MANUFACTURER'S RECOMMENDED ADHESIVE, OVERLAP SEAMS AT LEAST 1 INCH, AND SEAL JOINTS WITH FLASHING SEALANT.
C. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS:
1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.
2. WHEN PREFORMED INSULATION ELBOWS AND FITTINGS ARE NOT AVAILABLE, INSTALL MITERED SECTIONS OF PIPE INSULATION, TO A THICKNESS EQUAL TO ADJOINING PIPE INSULATION. SECURE INSULATION MATERIALS WITH WIRE OR BANDS.
D. INSULATION INSTALLATION ON VALVES AND PIPE SPECIALTIES:
1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.
2. WHEN PREFORMED SECTIONS ARE NOT AVAILABLE, INSTALL MITERED SECTIONS OF PIPE INSULATION TO VALVE BODY.
3. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.
4. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR FLANGE INSULATION APPLICATION.

3.6 INDOOR PIPING INSULATION SCHEDULE
A. CONDENSATE AND EQUIPMENT DRAIN WATER BELOW 60 DEG F:
1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:
A. FLEXIBLE ELASTOMERIC: 3/4 INCH THICK.
B. HEATING-HOT-WATER SUPPLY AND RETURN, 200 DEG F AND BELOW:
1. NPS 12 AND SMALLER: INSULATION SHALL BE THE FOLLOWING:
A. MINERAL-FIBER, PREFORMED PIPE, TYPE I: 2 INCHES THICK.
C. REFRIGERANT SUCTION AND HOT-GAS PIPING:
1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:
A. FLEXIBLE ELASTOMERIC: 1 INCH THICK.
D. REFRIGERANT SUCTION AND HOT-GAS FLEXIBLE TUBING:
1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:
A. FLEXIBLE ELASTOMERIC: 1 INCH THICK.

3.7 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE
A. REFRIGERANT SUCTION AND HOT-GAS PIPING OR TUBING:
1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:
A. FLEXIBLE ELASTOMERIC: 2 INCHES THICK.
B. HEAT-RECOVERY PIPING:
1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:
A. FLEXIBLE ELASTOMERIC: 2 INCHES THICK.

3.8 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE
A. INSTALL JACKET OVER INSULATION MATERIAL. FOR INSULATION WITH FACTORY-APPLIED JACKET, INSTALL THE FIELD-APPLIED JACKET OVER THE FACTORY-APPLIED JACKET.
B. IF MORE THAN ONE MATERIAL IS LISTED, SELECTION FROM MATERIALS LISTED IS CONTRACTOR'S OPTION.
C. PIPING, CONCEALED:
1. NONE.
D. PIPING, EXPOSED:
1. PVC: 20 MILS THICK.

END OF SECTION 230719

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TOWN OF SANBORNTON ★ GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED – PROFESSIONAL ENGINEER – 10/20/2021
SCALE:	N.T.S.	
DESN. BY:	MJB	
DRAWN BY:	DTV	
CHKD BY:	TWB	
ISSUE DATE:	10/20/2021	

REVISIONS

SHEET TITLE:
SPECIFICATIONS

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SPECIFICATIONS M5.4

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SECTION 230900 – INSTRUMENTATION AND CONTROL FOR MECHANICAL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. DIRECT DIGITAL CONTROL (DDC) EQUIPMENT FOR INTEGRATION INTO THE TRANE-MITSUBISHI CENTRAL CONTROLLER OR BOILER CONTROLLER.
B. INSTALLATION.

1.2 SYSTEM DESCRIPTION
A. SYSTEM SUMMARY:
1. **THE VRF SYSTEM CONTROLLER SHALL BE THE ONLY CENTRAL CONTROLLER. THE INTENT IS FOR A STAND ALONE SYSTEM WITHOUT WEB BASED INTEGRATION OR A CENTRAL DDC WORK STATION. THE BOILER AND ASSOCIATED PUMPS SHALL NOT BE INTEGRATED INTO THE VRF SYSTEM CONTROLLER. THE VRF CONTROLLER SHALL CONTROL THE ENERGY RECOVERY UNITS, ASSOCIATED MOTORIZED DAMPERS AND BASEBOARD CONTROL VALVES. PROVIDE NECESSARY ACTUATORS, VALVES AND OTHER ACCESSORIES REQUIRED TO ACHIEVE THE SEQUENCES OF OPERATION NOTED BELOW.**

1.3 DEFINITIONS
A. NOTE: THE TERMS ATC, BAS, AND DDC MAY BE USED INTERCHANGEABLY IN THIS SECTION AND ON THE DRAWINGS, TO INDICATE THE OVERALL CONTROL SYSTEM.

1.4 SUBMITTALS
A. PRODUCT DATA: INCLUDE MANUFACTURER'S TECHNICAL LITERATURE FOR EACH CONTROL DEVICE. INDICATE DIMENSIONS, CAPACITIES, PERFORMANCE CHARACTERISTICS, ELECTRICAL CHARACTERISTICS, FINISHES FOR MATERIALS, AND INSTALLATION AND STARTUP INSTRUCTIONS FOR EACH TYPE OF PRODUCT INDICATED.
HARDWARE: BILL OF MATERIALS OF EQUIPMENT INDICATING QUANTITY, MANUFACTURER, AND MODEL NUMBER. INCLUDE TECHNICAL DATA FOR CONTROL UNITS, TRANSDUCERS/TRANSMITTERS, SENSORS, ACTUATORS, VALVES, RELAYS/SWITCHES, CONTROL PANELS, AND OPERATOR INTERFACE EQUIPMENT.
1. CONTROLLED SYSTEMS: INSTRUMENTATION LIST WITH ELEMENT NAME, TYPE OF DEVICE, MANUFACTURER, MODEL NUMBER, AND PRODUCT DATA. INCLUDE WRITTEN DESCRIPTION OF SEQUENCE OF OPERATION INCLUDING SCHEMATIC DIAGRAM.

1.5 COORDINATION
A. COORDINATE LOCATION OF THERMOSTATS AND OTHER EXPOSED CONTROL SENSORS WITH CONTRACT DRAWINGS BEFORE INSTALLATION.
B. COORDINATE EQUIPMENT WITH DIVISION 26 AND EXISTING FIRE ALARM SYSTEM TO ACHIEVE COMPATIBILITY WITH EQUIPMENT THAT INTERFACES WITH THAT SYSTEM.
C. COORDINATE LINE-VOLTAGE POWER SUPPLIES WITH DIVISION 26.

1.6 WARRANTY
A. COMPONENTS, SYSTEM SOFTWARE, PARTS, AND ASSEMBLIES FURNISHED UNDER THIS SECTION SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR 1 YEAR FROM ACCEPTANCE DATE.
B. LABOR TO TROUBLESHOOT, REPAIR, REPROGRAM, OR REPLACE SYSTEM COMPONENTS SHALL BE PROVIDED AT NO CHARGE TO THE OWNER DURING THE WARRANTY PERIOD.

PART 2 - PRODUCTS

2.1 ACCEPTABLE SUPPLIER
A. ACCEPTABLE MANUFACTURER AND INSTALLER:
1. TRANE, INSTALLED BY TRANE, 15 CONSTITUTION DRIVE, BEDFORD, NH 03110
2. OR APPROVED EQUAL.
B. THE TEMPERATURE CONTROL CONTRACTOR (OR SUBCONTRACTOR) SHALL HEREINAFTER BE REFERRED TO AS THE ATC CONTRACTOR.

2.2 CONTROL VALVES
A. TERMINAL UNIT CONTROL VALVES: BRONZE BODY, BRONZE TRIM, 2 OR 3 PORTS AS INDICATED, REPLACEABLE PLUGS AND SEATS, AND UNION AND THREADED ENDS. VALVES WITH ENDS OTHER THAN THREADED OR FACTORY-INTEGRAL UNIONS ARE NOT ALLOWED.
1. APPLICATIONS: FINTUBE RADIATION.
2. HONEYWELL "SMALL LINEAR CONTROL VALVES" WITH "LINEAR VALVE ACTUATORS" (OR EQUAL) MAY BE USED ONLY FOR VAV BOX COILS AND HOT WATER DUCT COILS; THEY MAY NOT BE USED FOR OTHER COIL OR EQUIPMENT TYPES.
3. RATING: CLASS 125 FOR SERVICE AT 125 PSIG (860 KPA) AND 250 DEG F (121 DEG C) OPERATING CONDITIONS.
4. CLOSE-OFF (DIFFERENTIAL) PRESSURE RATING: COMBINATION OF ACTUATOR AND TRIM SHALL PROVIDE MINIMUM CLOSE-OFF PRESSURE RATING SUFFICIENT TO CLOSE AGAINST PUMP SHUTOFF HEAD.
5. FLOW CHARACTERISTICS: 2-WAY VALVES SHALL HAVE EQUAL PERCENTAGE CHARACTERISTICS; 3-WAY VALVES SHALL HAVE LINEAR CHARACTERISTICS.

2.3 THERMOSTATS AND TEMPERATURE SENSORS
A. THERMOSTATS AND SENSORS IN LOCATIONS IN REGULAR VIEW BY THE OCCUPANTS SHALL HAVE COVERS WHICH ARE SIMPLE, AESTHETICALLY PLEASING, NEUTRAL IN COLOR, WITH MANUFACTURER'S LOGO, IF ANY, IN BLACK OR NEUTRAL COLOR, AND SHALL FIT FLUSH TO THE SURROUNDING WALL SURFACE.
B. TAMPER-RESISTANT COVERS AND GUARDS:
1. PROVIDE PROTECTIVE LOCKABLE GUARDS FOR THERMOSTATS AND TEMPERATURE SENSORS LOCATED IN HIGH TRAFFIC AND UNSECURE AREAS. THESE AREAS SHALL INCLUDE, BUT NOT BE LIMITED TO:
A. CORRIDORS.
B. LOBBIES.
C. TOILET ROOMS.
D. STORAGE AREAS.
E. VESTIBULES.

2.4 CURRENT TRANSFORMERS
A. CURRENT TRANSFORMERS (CTS) ARE NOT AN ACCEPTABLE SUBSTITUTE FOR PUMP OR FAN MONITORING WHERE FLOW SWITCHES OR PRESSURE SWITCHES ARE SPECIFIED.
B. PROVIDE CTS AS REQUIRED FOR THE SEQUENCES OF OPERATION SPECIFIED.

2.5 EXAMINATION
A. VERIFY THAT POWER SUPPLY AND DATA OUTLET IS AVAILABLE TO CONTROL UNITS AND OPERATOR WORKSTATION.

2.6 ELECTRICAL WIRING AND CONNECTION INSTALLATION
A. WIRING AND CONDUITS SHALL BE PROPERLY SUPPORTED AND RUN IN A NEAT AND WORKMANLIKE MANNER. WIRING AND CONDUITS EXPOSED AND IN EQUIPMENT ROOMS SHALL RUN PARALLEL TO OR AT RIGHT ANGLES TO THE BUILDING STRUCTURE. WIRING AND CONDUITS WITHIN ENCLOSURES SHALL BE NEATLY BUNDLED AND ANCHORED TO PREVENT OBSTRUCTION TO DEVICES AND TERMINALS. WIRING, CONDUITS, WALL BOXES, AND ACCESSORIES SHALL CONFORM TO ELECTRICAL SPECIFICATIONS
B. THE ATC CONTRACTOR SHALL BE RESPONSIBLE FOR ELECTRICAL INSTALLATION, INCLUDING ANY LOW VOLTAGE AND LINE VOLTAGE WIRING WHICH IS REQUIRED FOR A FULLY FUNCTIONAL CONTROL SYSTEM AND NOT INDICATED ON THE ELECTRICAL DRAWINGS OR REQUIRED BY THE ELECTRICAL SPECIFICATIONS.
C. WIRING SHALL BE IN ACCORDANCE WITH LOCAL AND NATIONAL CODES AND REGULATIONS.
D. PROVIDE ELECTRICAL MATERIALS AND INSTALLATION UNDER THIS SECTION. REQUIREMENTS AND STANDARDS SHALL BE AS SPECIFIED IN OTHER SECTIONS AND DIVISIONS OF THE SPECIFICATIONS, AS INDICATED IN PARAGRAPHS BELOW.
1. INSTALL RACEWAYS, BOXES, AND CABINETS IN CONFORMANCE TO THE ELECTRICAL DRAWINGS.
2. INSTALL BUILDING WIRE AND CABLE IN CONFORMANCE TO ELECTRICAL DRAWINGS.
3. PROVIDE INTERFACE WIRING (LINE AND LOW VOLTAGE) AS REQUIRED TO COMPLETE ATC SYSTEM INSTALLATION.
E. CONTROL WIRING IN BOILER ROOM, MECHANICAL ROOMS, AND EQUIPMENT ROOMS SHALL BE INSTALLED IN CONDUIT WHICH SHALL COMPLY WITH THE REQUIREMENTS OF THE ELECTRICAL SPECIFICATIONS.
F. ELECTRONIC LOW-VOLTAGE WIRING SHALL BE #18 AWG MINIMUM THHN AND SHIELDED IF REQUIRED.
G. PROVIDE POWER FOR NORMALLY-OPENFINTUBE, BASEBOARD HOT WATER VALVES FROM A CENTRAL SOURCE(S). INTERLOCK WITH HOT WATER PUMP(S) TO DE-ENERGIZE VALVES WHEN PUMP IS DE-ENERGIZED.
H. POWER FOR ANY TEMPERATURE CONTROL PANELS REQUIRED IN ADDITION TO THOSE INDICATED ON THE DRAWINGS SHALL BE THE RESPONSIBILITY OF THIS SECTION. POWER TO TEMPERATURE CONTROL PANELS SHALL BE THROUGH "STAND-BY" POWER CIRCUITS WHICH ARE POWERED THROUGH THE BUILDING'S EMERGENCY GENERATOR.

2.7 INSTALLATION
A. WALL MOUNTED THERMOSTATS AND TEMPERATURE SENSORS SHALL BE ATTACHED TO AN ELECTRICAL WALL BOX ATTACHED TO A WALL STUD, MASONRY WALL, OR TO BLOCKING. ATTACHING TO GYPSUM WALLBOARD ONLY SHALL NOT BE ALLOWED.
B. MOUNTING HEIGHTS OF ROOM SENSORS, THERMOSTATS, AND OTHER DEVICES, WHICH HAVE FEATURES WHICH OCCUPANTS MAY ADJUST OR SET BY TOUCHING, SHALL BE INSTALLED IN LOCATIONS AND HEIGHTS CONFORMING TO U.S. DEPARTMENT OF JUSTICE – 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN.
1. UNOBSTRUCTED FORWARD OR SIDE REACH: REACHES, MEASURED BY DISTANCE ABOVE THE FINISHED FLOOR OR GROUND SURFACE UPON WHICH THE OCCUPANT SHALL BE SITTING OR STANDING, SHALL BE A HIGH OF 48 INCHES (1220 MM) MAXIMUM MEASURED TO THE TOP OF THE DEVICE, AND A LOW OF 15 INCHES (380 MM) MINIMUM MEASURED TO THE BOTTOM OF THE DEVICE.
2. OBSTRUCTED HIGH REACH: WHERE A HIGH FORWARD REACH IS OVER AN OBSTRUCTION, THE CLEAR FLOOR SPACE SHALL EXTEND BENEATH THE ELEMENT FOR A DISTANCE NOT LESS THAN THE REQUIRED REACH DEPTH OVER THE OBSTRUCTION. THE HIGH FORWARD REACH SHALL BE 48 INCHES (1220 MM) MAXIMUM WHERE THE REACH DEPTH IS 20 INCHES (510 MM) MAXIMUM. WHERE THE REACH DEPTH EXCEEDS 20 INCHES (510 MM), THE HIGH FORWARD REACH SHALL BE 44 INCHES (1120 MM) MAXIMUM AND THE REACH DEPTH SHALL BE 25 INCHES (635 MM) MAXIMUM.
3. COORDINATE WITH ELECTRICAL TO MATCH HEIGHTS FOR AN AESTHETICALLY PLEASING APPEARANCE.
C. VERIFY LOCATION OF ROOM TEMPERATURE SENSORS AND OTHER EXPOSED CONTROL SENSORS WITH DRAWINGS AND ROOM DETAILS BEFORE INSTALLATION.
1. THERMOSTATS AND TEMPERATURE SENSORS ARE INDICATED ON THE DRAWINGS FOR GENERAL LOCATION. TERMINAL HEAT TRANSFER UNITS AND FANS WHICH CONTROL SPACE TEMPERATURE SHALL BE PROVIDED WITH THERMOSTATIC CONTROL, WHETHER OR NOT A THERMOSTAT OR TEMPERATURE SENSOR HAS BEEN INDICATED ON THE DRAWINGS.
2. LOCATE IN THE GENERAL LOCATION INDICATED, AND COORDINATE TO GROUP TOGETHER WITH ROOM LIGHT SWITCHES AND OTHER DEVICES OF SIMILAR HEIGHT, TO MINIMIZE DISRUPTION OF OPEN WALL SPACE.
3. LOCATE TO NOT BE ABOVE ELECTRICAL DIMMERS.
4. LOCATE TO AVOID HEAT-GENERATING EQUIPMENT SUCH AS COMPUTERS, COPIERS, COOKING EQUIPMENT, COFFEE MAKERS, VENDING MACHINES, AND REFRIGERATORS. WHERE ELECTRICAL OUTLETS ARE INDICATED NEAR SENSORS, VERIFY WHETHER EQUIPMENT IS INTENDED.
5. LOCATE TO AVOID HEATING PIPING WHICH MAY BE CONCEALED IN PARTITIONS.
6. LOCATE AWAY FROM WINDOWS AND EXTERIOR DOORS.
7. LOCATE TO AVOID OTHER FALSE SOURCES OF HEAT SUCH AS STRONG SUNLIGHT.
D. PROVIDE GUARDS ON ROOM SENSORS AND THERMOSTATS IN THE FOLLOWING LOCATIONS:
1. PUBLIC AREAS OTHER THAN CLASSROOMS AND OFFICES, INCLUDING BUT NOT LIMITED TO: CORRIDORS, HALLWAYS, ENTRANCES, LOBBIES, VESTIBULES, STAIRWELLS, TOILET ROOMS, LOCKER ROOMS, STORAGE ROOMS, CAFETERIAS, AND GYMNASIUMS.
2. LOCATIONS VULNERABLE TO TRAFFIC.
3. WHERE INDICATED.
E. OUTDOOR AIR TEMPERATURE SENSOR(S) SHALL BE INSTALLED ON THE NORTH SIDE OF THE BUILDING.
F. CONNECT HAND-OFF-AUTO SELECTOR SWITCHES TO OVERRIDE AUTOMATIC INTERLOCK CONTROLS WHEN SWITCH IS IN HAND POSITION.
G. CONNECT LEAD-LAG CONTROLS TO LOCK OUT THE FAILED OR NON-SELECTED MOTOR, TO PREVENT SIMULTANEOUS OPERATION.
H. CONNECT LEAD-LAG CONTROLS SO THAT ONLY 1 MOTOR CAN RUN IN STARTER "HAND" POSITION.
I. CONNECT FIRE ALARM SHUTDOWN OF MOTORS ON THE LOAD SIDE OF CONTROLS AND HAND-OFF-AUTO SWITCHES, TO PREVENT MOTOR FROM RUNNING IN ANY SWITCH POSITION DURING FIRE ALARM.
J. FOR COMPONENTS TO BE INSTALLED UNDER OTHER SECTIONS OF THE SPECIFICATIONS, PROVIDE DELIVERY OF COMPONENTS TO APPROPRIATE SUBCONTRACTORS, PROVIDE INSTALLATION INSTRUCTIONS, AND SUPERVISE THEIR INSTALLATION.
K. INSTALL HYDRONIC INSTRUMENT WELLS, VALVES, AND OTHER ACCESSORIES ACCORDING TO DIVISION 23 SECTION "HYDRONIC PIPING."
1. SENSORS SHALL BE IMMERSION TYPE IN WELLS UNLESS OTHERWISE SPECIFIED OR INDICATED.
2. ENLARGE PIPING AT WELLS TO PREVENT EXCESS INTERFERENCE WITH FLOW.
3. LOCATE WELLS TO ENSURE INSERTION IN ACTIVE FLOWING SECTION OF PIPING OR TANK.
4. FILL SENSOR WELLS WITH HONEYWELL THERMAL HEAT TRANSFER PASTE TO ENSURE GOOD CONDUCTION.
L. UNLESS OTHERWISE INDICATED, ACTUATORS SHALL BE SPRING LOADED AND SHALL, UPON A LOSS OF POWER, ACTUATE THEIR DEVICE TO AN APPROPRIATE "FAIL SAFE" POSITION.
1. HOT WATER VALVES - FAIL SAFE TO FULLY OPEN.
2. OUTSIDE AND EXHAUST AIR DAMPERS - FAIL SAFE TO FULLY CLOSED.

2.8 VALIDATION

THE ATC CONTRACTOR SHALL COMPLETELY CHECK OUT, CALIBRATE, AND TEST CONNECTED HARDWARE TO INSURE THAT THE SYSTEM PERFORMS IN ACCORDANCE WITH THE APPROVED SUBMITTALS FOR SPECIFICATIONS AND SEQUENCES OF OPERATIONS.

2.9 DEMONSTRATION
A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, AND MAINTAIN MECHANICAL INSTRUMENTATION AND CONTROLS.

2.10 TRAINING
A. TRAINING SHALL BE BY THE ATC SUBCONTRACTOR AND SHALL UTILIZE SPECIFIED MANUALS AND AS-BUILT DOCUMENTATION. VIDEO RECORD EACH TRAINING SESSION, AND TURN THE COMPLETED VIDEO OVER TO THE OWNER WHEN TRAINING HAS BEEN COMPLETED.
B. OPERATOR TRAINING SHALL INCLUDE 2 FOUR-HOUR SESSIONS ENCOMPASSING:
1. MODIFYING SET POINTS.
2. SEQUENCE OF OPERATION REVIEW.
3. USE OF THE SPECIFIED FUNCTIONS.
4. SETTING AND ADJUSTING OF OCCUPANCY SCHEDULES.
5. TROUBLESHOOTING OF SENSORS.
6. OWNER QUESTIONS/CONCERNS.
C. TRAINING SESSIONS SHALL BE CONDUCTED AT PROJECT SUBSTANTIAL COMPLETION.

2.11 HEATING/COOLING MODE
A. HEATING MODE:
1. HEATING MODE IS AUTOMATICALLY ENABLED WHEN OUTSIDE AIR TEMPERATURE DROPS BELOW SETPOINT (60°F, ADJUSTABLE).
2. HEATING CONTROL VALVES ARE POWERED FROM DEDICATED CIRCUITS. WHEN THE HOT WATER PUMPS ARE DISABLED, CONTROL POWER TO THE VALVES IS DE-ENERGIZED, ALLOWING THE VALVES TO GO TO FAILSAFE POSITION. THIS IS TO PROLONG ACTUATOR LIFE BY TURNING THEM OFF IN WARM WEATHER.
B. COOLING MODE:
1. COOLING MODE IS AUTOMATICALLY ENABLED WHEN OUTSIDE AIR TEMPERATURE RISES ABOVE SETPOINT (10°F, ADJUSTABLE) OR WHEN THERE IS A CALL FOR COOLING FROM THE ROOM SENSOR OR THE HIGH-TEMPERATURE ALARM IN ANY SPACE. COOLING MODE IS AUTOMATICALLY DISABLED WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW SETPOINT, IF NO SPACE IS CALLING FOR MECHANICAL COOLING.
C. DEADBAND (ZERO-ENERGY MODE): IN SPACES AND SYSTEMS WITH BOTH HEATING AND COOLING SETPOINTS, THERE SHALL BE A DIFFERENCE OF AT LEAST 4°F BETWEEN TEMPERATURE SETPOINTS, UNLESS OTHERWISE SPECIFIED. WHEN THE SENSED TEMPERATURE OR HUMIDITY IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE SYSTEM SHALL OPERATE WITH NO HEATING HOT WATER OR COOLING EXCEPT AS REQUIRED TO MAINTAIN THE STATUS QUO.

2.12 HEATING SUPPLY WATER TEMPERATURE CONTROL
A. HOT WATER BOILERS ARE OPERATED INDEPENDENTLY OF ANY OTHER SYSTEM CONTROLS.
1. BOILERS B-1
A. THE BOILER IS ENABLED ON BASED ON SYSTEM DEMAND.
B. WHEN A BOILER IS ENERGIZED, ITS GAS BURNER FIRES (4 TO 1 MODULATION) TO MAINTAIN SETPOINT.

C. THE BOILER SETPOINT IS RESET BASED ON OUTDOOR AIR TEMPERATURE, IN A SUPPLY TEMPERATURE RANGE OF 110 TO 160°F (ADJUSTABLE) OVER AN OUTDOOR RANGE OF -10 TO 50°F.
B. LOOP TEMPERATURE CONTROL:
1. THE HEATING WATER SUPPLY SETPOINT IS RESET BASED ON OUTDOOR AIR TEMPERATURE, IN A SUPPLY TEMPERATURE RANGE OF 100 TO 160°F OVER AN OUTDOOR RANGE OF -10 TO 50°F.
2. THE BOILER PUMPS SUPPLIED WITH THE BOILERS SHALL OPERATE WHEN THE BOILERS ARE FIRING.

2.13 HOT WATER CIRCULATING PUMPS (HWP-1 & 2):
A. PUMPS ARE STARTED AND STOPPED THROUGH THE **BOILER** CONTROL SYSTEM. THE LEAD PUMP RUNS CONTINUOUSLY IN HEATING MODE.
B. THE ECM MOTORS WITH THE PUMPS SHALL MODULATE THE PUMP SPEED TO MAINTAIN SYSTEM DIFFERENTIAL PRESSURE.

2.14 ENERGY RECOVERY UNIT:
A. THE UNIT IS SCHEDULED FOR AUTOMATIC OPERATION ON A TIME OF DAY BASIS FOR OCCUPIED AND UNOCCUPIED MODES.
B. WHEN UNIT IS CALLED TO START, THE OUTSIDE AIR AND EXHAUST AIR DAMPERS OPEN FULLY. WHEN AN AUXILIARY SWITCH AT THE DAMPER ACTUATOR PROVES EACH DAMPER IS NEARLY FULL OPEN, THE FAN STARTS.
C. WHEN UNIT IS DE-ENERGIZED: OUTSIDE AIR DAMPER IS CLOSED; EXHAUST AIR DAMPER IS CLOSED; HEATING WATER VALVE MODULATES TO PREVENT COIL FREEZING; ENERGY RECOVERY SYSTEM IS DEENERGIZED.

2.15 VARIABLE-REFRIGERANT FLOW (VRF) SYSTEM
A. CONTROLS FURNISHED WITH THE SYSTEM PROVIDE HEATING, COOLING, SIMULTANEOUS HEATING AND COOLING, HEAT RECOVERY, ZONE DAMPER CONTROL, TIME FUNCTIONS, USER OCCUPIED OVERRIDE, INTERLOCK WITH BUILDING FANS AND VENTILATION SYSTEMS, AND ALARM OUTPUTS.
B. THE ROOM WALL-MOUNTED CONTROLLERS ARE INSTALLED UNDER OTHER DIVISION 23 SECTIONS, AND ARE INTEGRATED WITH THE CONTROL OF ROOM FINTUBE HEATING AND OTHER FUNCTIONS UNDER THIS SECTION.
C. THE WALL-MOUNTED CONTROLLERS PROVIDE CONTROL OF ROOM FINTUBE HEATING, IF THEY ARE CAPABLE OF THIS FUNCTION. THE FINTUBE PROVIDES NIGHT HEATING, WITH THE VRF ROOM UNIT ONLY OPERATING IF THE ROOM TEMPERATURE FALLS TOO FAR BELOW SETPOINT.
D. THE INTEGRAL CONDENSATE PUMPS IN CASSETTE-STYLE UNITS CYCLE AS REQUIRED, AND DISABLE COOLING IF AN OVERFLOW CONDITION IS SENSED.
E. THE CONDENSATE PUMPS ASSOCIATED WITH WALL-MOUNTED UNITS CYCLE AS REQUIRED, AND DISABLE COOLING IF AN OVERFLOW CONDITION IS SENSED.

2.16 BASEBOARD AND FINTUBE RADIATION (STAND-ALONE)
A. SPACE SENSOR: WALL-MOUNTED, WITH SETPOINT SELECTOR AND OCCUPIED/UNOCCUPIED OVERRIDE BUTTON.
B. SPACE SENSOR CYCLES 2-POSITION CONTROL VALVE TO MAINTAIN ROOM TEMPERATURE (SETPOINT 70°F OCCUPIED/60°F UNOCCUPIED, ADJUSTABLE).

2.17 DOMESTIC WATER HEATER AND CIRCULATING PUMPS:
A. THE UNIT-MOUNTED CONTROLS CYCLE THE GAS BURNER TO MAINTAIN WATER TEMPERATURE (INITIAL SETPOINT 140°F, ADJUSTABLE).
B. DOMESTIC HOT WATER CIRCULATING PUMP HWC-1 IS ENERGIZED WHENEVER THE BUILDING IS IN OCCUPIED MODE.

2.18 RE-START PHASING AFTER POWER INTERRUPTION
A. UPON A POWER INTERRUPTION, A LOSS OF POWER, OR AT MORNING START-UP, EQUIPMENT OF ELECTRICAL POWER GREATER THAN OR EQUAL TO 1.0 HP IS STARTED IN A STAGED MANNER WHICH ALLOWS A TIME DELAY OF 30 SECONDS BETWEEN THE START OF EACH DEVICE.

END OF SECTION 230900

SECTION 231126 - FACILITY LIQUEFIED-PETROLEUM GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY
A. SECTION INCLUDES:
1. PIPES, TUBES, AND FITTINGS.
2. PIPING SPECIALTIES.
3. PIPING AND TUBING JOINING MATERIALS.
4. VALVES.
5. PRESSURE REGULATORS.

1.2 PERFORMANCE REQUIREMENTS
A. MINIMUM OPERATING-PRESSURE RATINGS:
1. FOR PIPING CONTAINING ONLY VAPOR:
A. PIPING AND VALVES: 125 PSIG UNLESS OTHERWISE INDICATED.
B. LPG SYSTEM PRESSURE WITHIN BUILDINGS: ONE PRESSURE RANGE. MORE THAN 0.5 PSIG BUT NOT MORE THAN 2 PSIG.

1.3 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF THE FOLLOWING:
1. PIPING SPECIALTIES.
2. VALVES. INCLUDE PRESSURE RATING, CAPACITY, SETTINGS, AND ELECTRICAL CONNECTION DATA OF SELECTED MODELS.
3. PRESSURE REGULATORS. INDICATE PRESSURE RATINGS AND CAPACITIES.
4. DIELECTRIC FITTINGS.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS
A. STEEL PIPE: ASTM A 53/A 53M, BLACK STEEL, SCHEDULES 40, TYPE E OR S, GRADE B.
1. MALLEABLE-IRON THREADED FITTINGS: ASME B16.3, CLASS 150, STANDARD PATTERN.
2. WROUGHT-STEEL WELDING FITTINGS: ASTM A 234/A 234M FOR BUTT WELDING AND SOCKET WELDING.
3. UNIONS: ASME B16.39, CLASS 150, MALLEABLE IRON WITH BRASS-TO-IRON SEAT, GROUND JOINT, AND THREADED ENDS.
4. FORGED-STEEL FLANGES AND FLANGED FITTINGS: ASME B16.5, MINIMUM CLASS 150, INCLUDING BOLTS, NUTS, AND GASKETS OF THE FOLLOWING MATERIAL GROUP, END CONNECTIONS, AND FACINGS:
A. MATERIAL GROUP: 1.1.
B. END CONNECTIONS: THREADED OR BUTT WELDING TO MATCH PIPE.
C. LAPPED FACE: NOT PERMITTED UNDERGROUND.
D. GASKET MATERIALS: ASME B16.20, METALLIC, FLAT, ASBESTOS FREE, ALUMINUM O-RINGS, AND SPIRAL-WOUND METAL GASKETS.
E. BOLTS AND NUTS: ASME B18.2.1, CARBON STEEL ABOVEGROUND, AND STAINLESS STEEL UNDERGROUND.
B. DRAWN-TEMPER COPPER TUBE: COMPLY WITH ASTM B 88, TYPE L.
1. COPPER FITTINGS: ASME B16.22, WROUGHT COPPER, AND STREAMLINED PATTERN.
2. BRONZE FLANGES AND FLANGED FITTINGS: ASME B16.24, CLASS 150.
A. GASKET MATERIAL: ASME B16.20, METALLIC, FLAT, ASBESTOS FREE, ALUMINUM O-RINGS, AND SPIRAL-WOUND METAL GASKETS.
B. BOLTS AND NUTS: ASME B18.2.1, CARBON STEEL OR STAINLESS STEEL.

2.2 PIPING SPECIALTIES
A. FLEXIBLE PIPING JOINTS:
1. APPROVED FOR LPG SERVICE.
2. STAINLESS-STEEL BELLOWS WITH WOVEN, FLEXIBLE, BRONZE, WIRE-REINFORCING PROTECTIVE JACKET.
3. MINIMUM WORKING PRESSURE OF 250 PSIG AND 250 DEG F OPERATING TEMPERATURE.
4. FLANGED- OR THREADED-END CONNECTIONS TO MATCH EQUIPMENT CONNECTED AND SHALL BE CAPABLE OF MINIMUM 3/4-INCH MISALIGNMENT.
5. MAXIMUM 36-INCH LENGTH FOR LIQUID LPG LINES.
B. Y-PATTERN STRAINERS:
1. BODY: ASTM A 126, CLASS B, CAST IRON WITH BOLTED COVER AND BOTTOM DRAIN CONNECTION.
2. END CONNECTIONS: THREADED ENDS FOR NPS 2 AND SMALLER; FLANGED ENDS FOR NPS 2-1/2 AND LARGER.
3. STRAINER SCREEN: 40-MESH STARTUP STRAINER AND PERFORATED STAINLESS-STEEL BASKET WITH 50 PERCENT FREE AREA.
4. CWP RATING: 125 PSIG.
C. T-PATTERN STRAINERS:
1. BODY: DUCTILE OR MALLEABLE IRON WITH REMOVABLE ACCESS COUPLING AND END CAP FOR STRAINER MAINTENANCE.
2. END CONNECTIONS: GROOVED ENDS.
3. STRAINER SCREEN: 40-MESH STARTUP STRAINER AND PERFORATED STAINLESS-STEEL BASKET WITH 57 PERCENT FREE AREA.
4. CWP RATING: 750 PSIG.
D. WEATHERPROOF VENT CAP: CAST- OR MALLEABLE-IRON INCREASER FITTING WITH CORROSION-RESISTANT WIRE SCREEN, WITH FREE AREA AT LEAST EQUAL TO CROSS-SECTIONAL AREA OF CONNECTING PIPE AND THREADED-END CONNECTION.

2.3 JOINING MATERIALS
A. JOINT COMPOUND AND TAPE: SUITABLE FOR LPG.
B. WELDING FILLER METALS: COMPLY WITH AWS D10.12/D10.12M FOR WELDING MATERIALS APPROPRIATE FOR WALL THICKNESS AND CHEMICAL ANALYSIS OF STEEL PIPE BEING WELDED.
C. BRAZING FILLER METALS: ALLOY WITH MELTING POINT GREATER THAN 1000 DEG F COMPLYING WITH AWS A5.8/A5.8M.

2.4 MANUAL GAS SHUTOFF VALVES
A. SEE "UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" AND "ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" ARTICLES FOR WHERE EACH VALVE TYPE IS APPLIED IN VARIOUS SERVICES.
B. METALLIC VALVES, NPS 2 AND SMALLER FOR LIQUID SERVICE: COMPLY WITH ASME B16.33 AND UL 842.
1. CWP RATING: 250 PSIG.
2. THREADED ENDS: COMPLY WITH ASME B1.20.1.
3. SOCKET ENDS FOR BRAZED JOINTS.
4. TAMPERPROOF FEATURE: LOCKING FEATURE FOR VALVES INDICATED IN "UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" AND "ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" ARTICLES.
5. LISTING BY CSA OR AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION FOR VALVES 1 INCH AND SMALLER.
6. VALVES 1-1/4 INCH AND LARGER SHALL BE SUITABLE FOR LPG SERVICE, WITH "WOG" INDICATED ON VALVE BODY.
C. GENERAL REQUIREMENTS FOR METALLIC VALVES, NPS 2 AND SMALLER FOR VAPOR SERVICE: COMPLY WITH ASME B16.33.
1. CWP RATING: 125 PSIG.
2. THREADED ENDS: COMPLY WITH ASME B1.20.1.
3. DRYSEAL THREADS ON FLARE ENDS: COMPLY WITH ASME B1.20.3.
4. TAMPERPROOF FEATURE: LOCKING FEATURE FOR VALVES INDICATED IN "UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" AND "ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" ARTICLES.
5. LISTING: LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION FOR VALVES 1 INCH AND SMALLER.
6. SERVICE MARK: VALVES 1-1/4 INCH TO NPS 2 SHALL HAVE INITIALS "WOG" PERMANENTLY MARKED ON VALVE BODY.
D. TWO-PIECE, FULL-PORT, BRONZE BALL VALVES WITH BRONZE TRIM: MSS SP-110.
1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
2. BALL: CHROME-PLATED BRONZE.
3. STEM: BRONZE; BLOWOUT PROOF.
4. SEATS: REINFORCED TFE; BLOWOUT PROOF.
5. PACKING: THREADED-BODY PACKNUT DESIGN WITH ADJUSTABLE-STEM PACKING.
6. ENDS: THREADED, FLARED, OR SOCKET AS INDICATED IN "UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" AND "ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" ARTICLES.
7. CWP RATING: 600 PSIG.
8. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
9. SERVICE: SUITABLE FOR LPG SERVICE WITH "WOG" INDICATED ON VALVE BODY.
E. BRONZE PLUG VALVES: MSS SP-78.
1. BODY: BRONZE, COMPLYING WITH ASTM B 584.
2. PLUG: BRONZE.
3. ENDS: THREADED, SOCKET, OR FLANGED AS INDICATED IN "UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" AND "ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE" ARTICLES.
4. OPERATOR: SQUARE HEAD OR LUG TYPE WITH TAMPERPROOF FEATURE WHERE INDICATED.
5. PRESSURE CLASS: 125 PSIG.
6. LISTING: VALVES NPS 1 AND SMALLER SHALL BE LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
7. SERVICE: SUITABLE FOR LPG SERVICE WITH "WOG" INDICATED ON VALVE BODY.

2.5 PRESSURE REGULATORS
A. GENERAL REQUIREMENTS:
1. SINGLE STAGE AND SUITABLE FOR LPG.
2. STEEL JACKET AND CORROSION-RESISTANT COMPONENTS.
3. ELEVATION COMPENSATOR.
4. END CONNECTIONS: THREADED FOR REGULATORS NPS 2 AND SMALLER; FLANGED FOR REGULATORS NPS 2-1/2 AND LARGER.
B. APPLIANCE PRESSURE REGULATORS: COMPLY WITH ANSI Z21.18.
1. BODY AND DIAPHRAGM CASE: DIE-CAST ALUMINUM.
2. SPRINGS: ZINC-PLATED STEEL; INTERCHANGEABLE.
3. DIAPHRAGM PLATE: ZINC-PLATED STEEL.
4. SEAT DISC: NITRILE RUBBER.
5. SEAL PLUG: ULTRAVIOLET-STABILIZED, MINERAL-FILLED NYLON.
6. FACTORY-APPLIED FINISH: MINIMUM THREE-LAYER POLYESTER AND POLYURETHANE PAINT FINISH.
7. REGULATOR MAY INCLUDE VENT LIMITING DEVICE, INSTEAD OF VENT CONNECTION, IF APPROVED BY AUTHORITIES HAVING JURISDICTION.
8. MAXIMUM INLET PRESSURE: 2 PSIG.

2.6 DIELECTRIC FITTINGS
A. GENERAL REQUIREMENTS: ASSEMBLY OF COPPER ALLOY AND FERROUS MATERIALS WITH SEPARATING NONCONDUCTIVE INSULATING MATERIAL. INCLUDE END CONNECTIONS COMPATIBLE WITH PIPES TO BE JOINED.
B. DIELECTRIC UNIONS:
1. DESCRIPTION:
A. STANDARD: ASSE 1079.
B. PRESSURE RATING: 125 PSIG MINIMUM AT 180 DEG F.
C. END CONNECTIONS: SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS.
C. DIELECTRIC FLANGES:
1. DESCRIPTION:
A. STANDARD: ASSE 1079.
B. FACTORY-FABRICATED, BOLTED, COMPANION-FLANGE ASSEMBLY.
C. PRESSURE RATING: 125 PSIG MINIMUM AT 180 DEG F.
D. END CONNECTIONS: SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS; THREADED SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS.
D. DIELECTRIC-FLANGE INSULATING KITS:
1. DESCRIPTION:
A. NONCONDUCTING MATERIALS FOR FIELD ASSEMBLY OF COMPANION FLANGES.
B. PRESSURE RATING: 150 PSIG.
C. GASKET: NEOPRENE OR PHENOLIC.
D. BOLT SLEEVES: PHENOLIC OR POLYETHYLENE.
E. WASHERS: PHENOLIC WITH STEEL BACKING WASHERS.

PART 3 - EXECUTION

3.1 PREPARATION
A. CLOSE EQUIPMENT SHUTOFF VALVES BEFORE TURNING OFF LPG TO PREMISES OR PIPING SECTION.
B. INSPECT LPG PIPING ACCORDING TO NFPA 58 AND THE INTERNATIONAL FUEL GAS CODE TO DETERMINE THAT LPG UTILIZATION DEVICES ARE TURNED OFF IN PIPING SECTION AFFECTED.
C. COMPLY WITH NFPA 58 AND THE INTERNATIONAL FUEL GAS CODE REQUIREMENTS FOR PREVENTION OF ACCIDENTAL IGNITION.

3.2 INDOOR PIPING INSTALLATION
A. COMPLY WITH THE INTERNATIONAL FUEL GAS CODE FOR INSTALLATION AND PURGING OF LPG PIPING.
B. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS. INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.
C. ARRANGE FOR PIPE SPACES, CHASES, SLOTS, SLEEVES, AND OPENINGS IN BUILDING STRUCTURE DURING PROGRESS OF CONSTRUCTION, TO ALLOW FOR MECHANICAL INSTALLATIONS.
D. LOCATE VALVES FOR EASY ACCESS.
E. INSTALL LPG PIPING AT UNIFORM GRADE OF 2 PERCENT DOWN TOWARD DRIP AND SEDIMENT TRAPS.
F. VERIFY FINAL EQUIPMENT LOCATIONS FOR ROUGHING-IN.
G. DRIPS AND SEDIMENT TRAPS: INSTALL DRIPS AT POINTS WHERE CONDENSATE MAY COLLECT, INCLUDING SERVICE-METER OUTLETS. LOCATE WHERE READILY ACCESSIBLE TO PERMIT CLEANING AND EMPTYING. DO NOT INSTALL WHERE CONDENSATE IS SUBJECT TO FREEZING.
1. CONSTRUCT DRIPS AND SEDIMENT TRAPS USING TEE FITTING WITH BOTTOM OUTLET PLUGGED OR CAPPED. USE NIPPLE A MINIMUM LENGTH OF 3 PIPE DIAMETERS, BUT NOT LESS THAN 3 INCHES LONG AND SAME SIZE AS CONNECTED PIPE. INSTALL WITH SPACE BELOW BOTTOM OF DRIP TO REMOVE PLUG OR CAP.
H. EXTEND RELIEF VENT CONNECTIONS FOR SERVICE REGULATORS, LINE REGULATORS, AND OVERPRESSURE PROTECTION DEVICES TO OUTDOORS AND TERMINATE WITH WEATHERPROOF VENT CAP.
I. USE ECCENTRIC REDUCER FITTINGS TO MAKE REDUCTIONS IN PIPE SIZES. INSTALL FITTINGS WITH LEVEL SIDE DOWN.
J. CONNECT BRANCH PIPING FROM TOP OR SIDE OF HORIZONTAL PIPING.
K. INSTALL UNIONS IN PIPES NPS 2 AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT. UNIONS ARE NOT REQUIRED AT FLANGED CONNECTIONS.
L. INSTALL STRAINER ON INLET OF EACH LINE-PRESSURE REGULATOR AND AUTOMATIC OR ELECTRICALLY OPERATED VALVE.

3.3 VALVE INSTALLATION
A. INSTALL REGULATORS AND OVERPRESSURE PROTECTION DEVICES WITH MAINTENANCE ACCESS SPACE ADEQUATE FOR SERVICING AND TESTING.

3.4 HANGER AND SUPPORT INSTALLATION
A. COMPLY WITH REQUIREMENTS FOR PIPE HANGERS AND SUPPORTS SPECIFIED IN SECTION 230529 "HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT."

3.5 CONNECTIONS
A. INSTALL LPG PIPING ELECTRICALLY CONTINUOUS, AND BONDED TO GAS APPLIANCE EQUIPMENT GROUNDING CONDUCTOR OF THE CIRCUIT POWERING THE APPLIANCE ACCORDING TO NFPA 70.
B. INSTALL PIPING ADJACENT TO APPLIANCES TO ALLOW SERVICE AND MAINTENANCE OF APPLIANCES.
C. CONNECT PIPING TO APPLIANCES USING MANUAL GAS SHUTOFF VALVES AND UNIONS. INSTALL VALVE WITHIN 72 INCHES OF EACH GAS-FIRED APPLIANCES AND EQUIPMENT. INSTALL UNION BETWEEN VALVE AND APPLIANCES OR EQUIPMENT.
D. SEDIMENT TRAPS: INSTALL TEE FITTING WITH CAPPED NIPPLE IN BOTTOM TO FORM DRIP, AS CLOSE AS PRACTICAL TO INLET OF EACH APPLIANCE.

3.6 PAINTING
A. COMPLY WITH REQUIREMENTS IN SECTION 099113 "EXTERIOR PAINTING" AND SECTION 099123 "INTERIOR PAINTING" FOR PAINTING INTERIOR AND EXTERIOR LPG PIPING.
B. PAINT EXPOSED, INTERIOR METAL PIPING, VALVES, SERVICE REGULATORS, SERVICE METERS AND METER BARS, EARTHQUAKE VALVES, AND PIPING SPECIALTIES, EXCEPT COMPONENTS WITH FACTORY-APPLIED PAINT OR PROTECTIVE COATING.
1. LATEX OVER ALKYD PRIMER SYSTEM: MPI INT 5.1Q.
A. PRIME COAT: ALKYD ANTICORROSIVE METAL PRIMER.
B. INTERMEDIATE COAT: INTERIOR LATEX MATCHING TOPCOAT.
C. TOPCOAT: INTERIOR LATEX (LOW SHEEN) (SATIN).
D. COLOR: GRAY.
C. DAMAGE AND TOUCHUP: REPAIR MARRED AND DAMAGED FACTORY-APPLIED FINISHES WITH MATERIALS AND BY PROCEDURES TO MATCH ORIGINAL FACTORY FINISH.

3.7 FIELD QUALITY CONTROL
A. PERFORM TESTS AND INSPECTIONS.
B. TESTS AND INSPECTIONS:
1. TEST, INSPECT, AND PURGE LPG ACCORDING TO NFPA 58 AND THE INTERNATIONAL FUEL GAS CODE AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.
C. LPG PIPING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
D. PREPARE TEST AND INSPECTION REPORTS.

3.8 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 2 PSIG
A. ABOVEGROUND, DISTRIBUTION PIPING SHALL BE ONE OF THE FOLLOWING:
1. SCHEDULE 40, STEEL PIPE WITH MALLEABLE-IRON FITTINGS AND THREADED JOINTS.
2. SCHEDULE 40, STEEL PIPE WITH WROUGHT-STEEL FITTINGS AND WELDED JOINTS.
3. DRAWN-TEMPER COPPER TUBE, TYPE L WITH WROUGHT-COPPER FITTINGS AND BRAZED JOINTS.

3.9 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE
A. VALVES FOR PIPE NPS 2 AND SMALLER AT SERVICE METER SHALL BE ONE OF THE FOLLOWING:
1. TWO-PIECE, FULL-PORT, BRONZE BALL VALVES WITH BRONZE TRIM.
2. BRONZE PLUG VALVE.

END OF SECTION 231126

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KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
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REVISIONS

SHEET TITLE:
SPECIFICATIONS

M5.5

SPECIFICATIONS M5.5

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SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES PIPE AND FITTING MATERIALS AND JOINING METHODS FOR THE FOLLOWING:
1. STEEL PIPE AND FITTINGS.
2. JOINING MATERIALS.
3. TRANSITION FITTINGS.
4. DIELECTRIC FITTINGS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF THE FOLLOWING:
1. PIPE.
2. FITTINGS.
3. JOINING MATERIALS.
4. BYPASS CHEMICAL FEEDER.

1.3 QUALITY ASSURANCE

A. INSTALLER QUALIFICATIONS:
1. INSTALLERS OF PRESSURE-SEALED JOINTS: INSTALLERS SHALL BE CERTIFIED BY PRESSURE-SEAL JOINT MANUFACTURER AS HAVING BEEN TRAINED AND QUALIFIED TO JOIN PIPING WITH PRESSURE-SEAL PIPE COUPLINGS AND FITTINGS.

B. STEEL SUPPORT WELDING: QUALIFY PROCEDURES AND PERSONNEL ACCORDING TO AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE - STEEL."

C. PIPE WELDING: QUALIFY PROCEDURES AND OPERATORS ACCORDING TO ASME BOILER AND PRESSURE VESSEL CODE: SECTION IX.
1. CERTIFY THAT EACH WELDER HAS PASSED AWS QUALIFICATION TESTS FOR WELDING PROCESSES INVOLVED AND THAT CERTIFICATION IS CURRENT.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. HYDRONIC PIPING COMPONENTS AND INSTALLATION SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING MINIMUM WORKING PRESSURE AND TEMPERATURE UNLESS OTHERWISE INDICATED:
1. HOT-WATER HEATING PIPING: 100 PSIG AT 200 DEG F.
2. AIR-VENT PIPING: 180 DEG F.
3. SAFETY-VALVE-INLET AND -OUTLET PIPING: EQUAL TO THE PRESSURE OF THE PIPING SYSTEM TO WHICH IT IS ATTACHED.

2.2 COPPER TUBE AND FITTINGS

A. DRAWN-TEMPER COPPER TUBING: ASTM B 88, TYPE L.

B. DWV COPPER TUBING: ASTM B 306, TYPE DWV.

C. COPPER OR BRONZE PRESSURE-SEAL FITTINGS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:
   A. VIEGA LLC.
2. HOUSING: COPPER.
3. O-RINGS AND PIPE STOPS: EPDM.
4. TOOLS: MANUFACTURER'S SPECIAL TOOLS.
5. MINIMUM 200-PSIG WORKING-PRESSURE RATING AT 250 DEG F.

D. WROUGHT-COPPER UNIONS: ASME B16.22.

2.3 STEEL PIPE AND FITTINGS

A. STEEL PIPE: ASTM A 53/A 53M, BLACK STEEL WITH PLAIN ENDS; WELDED AND SEAMLESS, GRADE B, AND WALL THICKNESS AS INDICATED IN "PIPING APPLICATIONS" ARTICLE.

B. CAST-IRON THREADED FITTINGS: ASME B16.4; CLASSES 125 AND 250 AS INDICATED IN "PIPING APPLICATIONS" ARTICLE.

C. CAST-IRON PIPE FLANGES AND FLANGED FITTINGS: ASME B16.1, CLASSES 25, 125, AND 250; RAISED GROUND FACE, AND BOLT HOLES SPOT FACED AS INDICATED IN "PIPING APPLICATIONS" ARTICLE.

D. WROUGHT-STEEL FITTINGS: ASTM A 234/A 234M, WALL THICKNESS TO MATCH ADJOINING PIPE.

E. STEEL PIPE NIPPLES: ASTM A 733, MADE OF SAME MATERIALS AND WALL THICKNESSES AS PIPE IN WHICH THEY ARE INSTALLED.

2.4 JOINING MATERIALS

A. SOLDER FILLER METALS: ASTM B 32, LEAD-FREE ALLOYS. INCLUDE WATER-FLUSHABLE FLUX ACCORDING TO ASTM B 813.

B. BRAZING FILLER METALS: AWS A5.8/A5.8M, BCUP SERIES, COPPER-PHOSPHORUS ALLOYS FOR JOINING COPPER WITH COPPER; OR BAG-1, SILVER ALLOY FOR JOINING COPPER WITH BRONZE OR STEEL.

2.5 TRANSITION FITTINGS

A. PLASTIC-TO-METAL TRANSITION FITTINGS:
1. ONE-PIECE FITTING WITH ONE THREADED BRASS OR COPPER INSERT AND ONE SOLVENT-CEMENT-JOINT END OF MATERIAL AND WALL THICKNESS TO MATCH PLASTIC PIPE MATERIAL.

2.6 DIELECTRIC FITTINGS

A. GENERAL REQUIREMENTS: ASSEMBLY OF COPPER ALLOY AND FERROUS MATERIALS WITH SEPARATING NONCONDUCTIVE INSULATING MATERIAL. INCLUDE END CONNECTIONS COMPATIBLE WITH PIPES TO BE JOINED.

B. DIELECTRIC UNIONS:
1. DESCRIPTION:
   A. STANDARD: ASSE 1079.
   B. PRESSURE RATING: 125 PSIG MINIMUM AT 180 DEG F.

C. DIELECTRIC NIPPLES:
1. DESCRIPTION:
   A. STANDARD: IAPMO PS 66.
   B. ELECTROPLATED STEEL NIPPLE, COMPLYING WITH ASTM F 1545.
   C. PRESSURE RATING: 300 PSIG AT 225 DEG F.
   D. END CONNECTIONS: MALE THREADED OR GROOVED.
   E. LINING: INERT AND NONCORROSIVE, PROPYLENE.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. HOT-WATER HEATING PIPING, ABOVEGROUND, NPS 2 AND SMALLER, SHALL BE ANY OF THE FOLLOWING:
1. TYPE L, DRAWN-TEMPER COPPER TUBING, WROUGHT-COPPER FITTINGS, AND SOLDERED BRAZED OR PRESSURE-SEAL JOINTS.
2. SCHEDULE 40, GRADE B STEEL PIPE; CLASS 125, CAST-IRON FITTINGS; CAST-IRON FLANGES AND FLANGE FITTINGS; AND THREADED JOINTS.

B. CONDENSATE-DRAIN PIPING: TYPE DWV, DRAWN-TEMPER COPPER TUBING, WROUGHT-COPPER FITTINGS, AND SOLDERED JOINTS.

C. AIR-VENT PIPING:
1. INLET: SAME AS SERVICE WHERE INSTALLED WITH METAL-TO-PLASTIC TRANSITION FITTINGS FOR PLASTIC PIPING SYSTEMS ACCORDING TO PIPING MANUFACTURER'S WRITTEN INSTRUCTIONS.
2. OUTLET: TYPE L, ANNEALED-TEMPER COPPER TUBING WITH SOLDERED OR FLARED JOINTS.

D. SAFETY-VALVE-INLET AND -OUTLET PIPING FOR HOT-WATER PIPING: SAME MATERIALS AND JOINING METHODS AS FOR PIPING SPECIFIED FOR THE SERVICE IN WHICH SAFETY VALVE IS INSTALLED WITH METAL-TO-PLASTIC TRANSITION FITTINGS FOR PLASTIC PIPING SYSTEMS ACCORDING TO PIPING MANUFACTURER'S WRITTEN INSTRUCTIONS.

3.2 PIPING INSTALLATIONS

A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.

B. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.

C. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.

D. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.

E. INSTALL PIPING TO PERMIT VALVE SERVICING.

F. INSTALL PIPING AT INDICATED SLOPES.

G. INSTALL PIPING FREE OF SAGS AND BENDS.

H. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.

I. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.

J. SELECT SYSTEM COMPONENTS WITH PRESSURE RATING EQUAL TO OR GREATER THAN SYSTEM OPERATING PRESSURE.

K. INSTALL GROUPS OF PIPES PARALLEL TO EACH OTHER, SPACED TO PERMIT APPLYING INSULATION AND SERVICING OF VALVES.

L. INSTALL DRAINS, CONSISTING OF A TEE FITTING, NPS 3/4 BALL VALVE, AND SHORT NPS 3/4 THREADED NIPPLE WITH CAP, AT LOW POINTS IN PIPING SYSTEM MAINS AND ELSEWHERE AS REQUIRED FOR SYSTEM DRAINAGE.

M. INSTALL PIPING AT A UNIFORM GRADE OF 0.2 PERCENT UPWARD IN DIRECTION OF FLOW.

N. REDUCE PIPE SIZES USING ECCENTRIC REDUCER FITTING INSTALLED WITH LEVEL SIDE UP.

O. INSTALL UNIONS IN PIPING, NPS 2 AND SMALLER, ADJACENT TO VALVES, AT FINAL CONNECTIONS OF EQUIPMENT, AND ELSEWHERE AS INDICATED.

P. INSTALL SHUTOFF VALVE IMMEDIATELY UPSTREAM OF EACH DIELECTRIC FITTING.

Q. COMPLY WITH REQUIREMENTS IN SECTION 230553 "IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT" FOR IDENTIFYING PIPING.

3.3 DIELECTRIC FITTING INSTALLATION

A. INSTALL DIELECTRIC FITTINGS IN PIPING AT CONNECTIONS OF DISSIMILAR METAL PIPING AND TUBING.

B. DIELECTRIC FITTINGS FOR NPS 2 AND SMALLER: USE DIELECTRIC NIPPLES.

3.4 HANGERS AND SUPPORTS

A. COMPLY WITH REQUIREMENTS IN SECTION 230529 "HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT" FOR HANGER, SUPPORT, AND ANCHOR DEVICES. COMPLY WITH THE FOLLOWING REQUIREMENTS FOR MAXIMUM SPACING OF SUPPORTS.

B. INSTALL THE FOLLOWING PIPE ATTACHMENTS:
1. ADJUSTABLE STEEL CLEVIS HANGERS FOR INDIVIDUAL HORIZONTAL PIPING LESS THAN 20 FEET LONG.
2. ADJUSTABLE ROLLER HANGERS AND SPRING HANGERS FOR INDIVIDUAL HORIZONTAL PIPING 20 FEET OR LONGER.
3. PIPE ROLLER: MSS SP-58, TYPE 44 FOR MULTIPLE HORIZONTAL PIPING 20 FEET OR LONGER, SUPPORTED ON A TRAPEZE.
4. SPRING HANGERS TO SUPPORT VERTICAL RUNS.
5. PROVIDE COPPER-CLAD HANGERS AND SUPPORTS FOR HANGERS AND SUPPORTS IN DIRECT CONTACT WITH COPPER PIPE.
6. ON PLASTIC PIPE, INSTALL PADS OR CUSHIONS ON BEARING SURFACES TO PREVENT HANGER FROM SCRATCHING PIPE.

C. INSTALL HANGERS FOR STEEL PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD SIZES:
1. NPS 3/4: MAXIMUM SPAN, 7 FEET.
2. NPS 1: MAXIMUM SPAN, 7 FEET.
3. NPS 1-1/2: MAXIMUM SPAN, 9 FEET.
4. NPS 2: MAXIMUM SPAN, 10 FEET.

D. INSTALL HANGERS FOR DRAWN-TEMPER COPPER PIPING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD SIZES:
1. NPS 3/4: MAXIMUM SPAN, 5 FEET; MINIMUM ROD SIZE, 1/4 INCH.
2. NPS 1: MAXIMUM SPAN, 6 FEET; MINIMUM ROD SIZE, 1/4 INCH.
3. NPS 1-1/4: MAXIMUM SPAN, 7 FEET; MINIMUM ROD SIZE, 3/8 INCH.
4. NPS 1-1/2: MAXIMUM SPAN, 8 FEET; MINIMUM ROD SIZE, 3/8 INCH.
5. NPS 2: MAXIMUM SPAN, 8 FEET; MINIMUM ROD SIZE, 3/8 INCH.

E. SUPPORT VERTICAL RUNS AT ROOF, AT EACH FLOOR, AND AT 10-FOOT INTERVALS BETWEEN FLOORS.

3.5 PIPE JOINT CONSTRUCTION

A. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE.

B. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPE AND FITTINGS BEFORE ASSEMBLY.

C. SOLDERED JOINTS: APPLY ASTM B 813, WATER-FLUSHABLE FLUX, UNLESS OTHERWISE INDICATED, TO TUBE END. CONSTRUCT JOINTS ACCORDING TO ASTM B 828 OR CDA'S "COPPER TUBE HANDBOOK," USING LEAD-FREE SOLDER ALLOY COMPLYING WITH ASTM B 32.

D. BRAZED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS'S "BRAZING HANDBOOK," "PIPE AND TUBE" CHAPTER, USING COPPER-PHOSPHORUS BRAZING FILLER METAL COMPLYING WITH AWS A5.8/A5.8M.

E. THREADED JOINTS: THREAD PIPE WITH TAPERED PIPE THREADS ACCORDING TO ASME B1.20.1. CUT THREADS FULL AND CLEAN USING SHARP DIES. REAM THREADED PIPE ENDS TO REMOVE BURRS AND RESTORE FULL ID. JOIN PIPE FITTINGS AND VALVES AS FOLLOWS:
1. APPLY APPROPRIATE TAPE OR THREAD COMPOUND TO EXTERNAL PIPE THREADS UNLESS DRY SEAL THREADING IS SPECIFIED.
2. DAMAGED THREADS: DO NOT USE PIPE OR PIPE FITTINGS WITH THREADS THAT ARE CORRODED OR DAMAGED. DO NOT USE PIPE SECTIONS THAT HAVE CRACKED OR OPEN WELDS.

F. PRESSURE-SEALED JOINTS: USE MANUFACTURER-RECOMMENDED TOOL AND PROCEDURE. LEAVE INSERTION MARKS ON PIPE AFTER ASSEMBLY.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. SIZES FOR SUPPLY AND RETURN PIPING CONNECTIONS SHALL BE THE SAME AS OR LARGER THAN EQUIPMENT CONNECTIONS.

B. INSTALL CONTROL VALVES IN ACCESSIBLE LOCATIONS CLOSE TO CONNECTED EQUIPMENT.

3.7 FIELD QUALITY CONTROL

A. PERFORM THE FOLLOWING TESTS ON HYDRONIC PIPING:
1. USE AMBIENT TEMPERATURE WATER AS A TESTING MEDIUM UNLESS THERE IS RISK OF DAMAGE DUE TO FREEZING. ANOTHER LIQUID THAT IS SAFE FOR WORKERS AND COMPATIBLE WITH PIPING MAY BE USED.
2. WHILE FILLING SYSTEM, USE VENTS INSTALLED AT HIGH POINTS OF SYSTEM TO RELEASE AIR. USE DRAINS INSTALLED AT LOW POINTS FOR COMPLETE DRAINING OF TEST LIQUID.
3. ISOLATE EXPANSION TANKS AND DETERMINE THAT HYDRONIC SYSTEM IS FULL OF WATER.
4. SUBJECT PIPING SYSTEM TO HYDROSTATIC TEST PRESSURE THAT IS NOT LESS THAN 1.5 TIMES THE SYSTEM'S WORKING PRESSURE. TEST PRESSURE SHALL NOT EXCEED MAXIMUM PRESSURE FOR ANY VESSEL, PUMP, VALVE, OR OTHER COMPONENT IN SYSTEM UNDER TEST. VERIFY THAT STRESS DUE TO PRESSURE AT BOTTOM OF VERTICAL RUNS DOES NOT EXCEED 90 PERCENT OF SPECIFIED MINIMUM YIELD STRENGTH OR 1.7 TIMES THE "SE" VALUE IN APPENDIX A IN ASME B31.9, "BUILDING SERVICES PIPING."
5. AFTER HYDROSTATIC TEST PRESSURE HAS BEEN APPLIED FOR AT LEAST 10 MINUTES, EXAMINE PIPING, JOINTS, AND CONNECTIONS FOR LEAKAGE. ELIMINATE LEAKS BY TIGHTENING, REPAIRING, OR REPLACING COMPONENTS, AND REPEAT HYDROSTATIC TEST UNTIL THERE ARE NO LEAKS.
6. PREPARE WRITTEN REPORT OF TESTING.

B. PERFORM THE FOLLOWING BEFORE OPERATING THE SYSTEM:
1. OPEN MANUAL VALVES FULLY.
2. INSPECT PUMPS FOR PROPER ROTATION.
3. SET MAKEUP PRESSURE-REDUCING VALVES FOR REQUIRED SYSTEM PRESSURE.
4. INSPECT AIR VENTS AT HIGH POINTS OF SYSTEM AND DETERMINE IF ALL ARE INSTALLED AND OPERATING FREELY (AUTOMATIC TYPE), OR BLEED AIR COMPLETELY (MANUAL TYPE).
5. SET TEMPERATURE CONTROLS SO ALL COILS ARE CALLING FOR FULL FLOW.
6. INSPECT AND SET OPERATING TEMPERATURES OF HYDRONIC EQUIPMENT, SUCH AS BOILERS, TO SPECIFIED VALUES.
7. VERIFY LUBRICATION OF MOTORS AND BEARINGS.

END OF SECTION 232113

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. REFRIGERANT PIPES AND FITTINGS.
2. REFRIGERANT PIPING VALVES AND SPECIALTIES.
3. REFRIGERANTS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF VALVE, REFRIGERANT PIPING, AND PIPING SPECIALTY.

1.3 PRODUCT STORAGE AND HANDLING

A. STORE PIPING WITH END CAPS IN PLACE TO ENSURE THAT PIPING INTERIOR AND EXTERIOR ARE CLEAN WHEN INSTALLED.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. LINE TEST PRESSURE FOR REFRIGERANT R-410A:
1. SUCTION LINES FOR AIR-CONDITIONING APPLICATIONS: 300 PSIG.
2. SUCTION LINES FOR HEAT-PUMP APPLICATIONS: 535 PSIG.
3. HOT-GAS AND LIQUID LINES: 535 PSIG.

2.2 COPPER TUBE AND FITTINGS

A. COPPER TUBE: ASTM B 88, TYPE K OR L.

B. WROUGHT-COPPER FITTINGS: ASME B16.22.

C. WROUGHT-COPPER UNIONS: ASME B16.22.

D. SOLDER FILLER METALS: ASTM B 32. USE 95-5 TIN ANTIMONY OR ALLOY HB SOLDER TO JOIN COPPER SOCKET FITTINGS ON COPPER PIPE.

E. BRAZING FILLER METALS: AWS A5.8/A5.8M.

F. FLEXIBLE CONNECTORS:
1. BODY: TIN-BRONZE BELLOWS WITH WOVEN, FLEXIBLE, TINNED-BRONZE-WIRE-REINFORCED PROTECTIVE JACKET.
2. END CONNECTIONS: SOCKET ENDS.
3. OFFSET PERFORMANCE: CAPABLE OF MINIMUM 3/4-INCH MISALIGNMENT IN MINIMUM 7-INCH-LONG ASSEMBLY.
4. WORKING PRESSURE RATING: FACTORY TEST AT MINIMUM 500 PSIG.
5. MAXIMUM OPERATING TEMPERATURE: 250 DEG F.

2.3 VALVES AND SPECIALTIES

A. PACKED-ANGLE VALVES:
1. BODY AND BONNET: FORGED BRASS OR CAST BRONZE.
2. PACKING: MOLDED STEM, BACK SEATING, AND REPLACEABLE UNDER PRESSURE.
3. OPERATOR: RISING STEM.
4. SEAT: NONROTATING, SELF-ALIGNING POLYTETRAFLUOROETHYLENE.
5. SEAL CAP: FORGED-BRASS OR VALOX HEX CAP.
6. END CONNECTIONS: SOCKET, UNION, THREADED, OR FLANGED.
7. WORKING PRESSURE RATING: 500 PSIG.
8. MAXIMUM OPERATING TEMPERATURE: 275 DEG F.

B. CHECK VALVES:
1. BODY: DUCTILE IRON, FORGED BRASS, OR CAST BRONZE; GLOBE PATTERN.
2. BONNET: BOLTED DUCTILE IRON, FORGED BRASS, OR CAST BRONZE; OR BRASS HEX PLUG.
3. PISTON: REMOVABLE POLYTETRAFLUOROETHYLENE SEAT.
4. CLOSING SPRING: STAINLESS STEEL.
5. END CONNECTIONS: SOCKET, UNION, THREADED, OR FLANGED.
6. MAXIMUM OPENING PRESSURE: 0.50 PSIG.
7. WORKING PRESSURE RATING: 500 PSIG.
8. MAXIMUM OPERATING TEMPERATURE: 275 DEG F.

C. SAFETY RELIEF VALVES: COMPLY WITH 2010 ASME BOILER AND PRESSURE VESSEL CODE; LISTED AND LABELED BY AN NRTL.
1. BODY AND BONNET: DUCTILE IRON AND STEEL, WITH NEOPRENE O-RING SEAL.
2. PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.
3. SEAT: POLYTETRAFLUOROETHYLENE.
4. END CONNECTIONS: THREADED.
5. WORKING PRESSURE RATING: 400 PSIG.
6. MAXIMUM OPERATING TEMPERATURE: 240 DEG F.

D. THERMOSTATIC EXPANSION VALVES: COMPLY WITH AHRI 750.
1. BODY, BONNET, AND SEAL CAP: FORGED BRASS OR STEEL.
2. DIAPHRAGM, PISTON, CLOSING SPRING, AND SEAT INSERT: STAINLESS STEEL.
3. PACKING AND GASKETS: NON-ASBESTOS.
4. CAPILLARY AND BULB: COPPER TUBING FILLED WITH REFRIGERANT CHARGE.
5. SUCTION TEMPERATURE: 40 DEG F.
6. SUPERHEAT: ADJUSTABLE.
7. REVERSE-FLOW OPTION (FOR HEAT-PUMP APPLICATIONS).
8. END CONNECTIONS: SOCKET, FLARE, OR THREADED UNION.
9. WORKING PRESSURE RATING: 700 PSIG.

E. STRAIGHT-TYPE STRAINERS:
1. BODY: WELDED STEEL WITH CORROSION-RESISTANT COATING.
2. SCREEN: 100-MESH STAINLESS STEEL.
3. END CONNECTIONS: SOCKET OR FLARE.
4. WORKING PRESSURE RATING: 500 PSIG.
5. MAXIMUM OPERATING TEMPERATURE: 275 DEG F.

F. ANGLE-TYPE STRAINERS:
1. BODY: FORGED BRASS OR CAST BRONZE.
2. DRAIN PLUG: BRASS HEX PLUG.
3. SCREEN: 100-MESH MONEL.
4. END CONNECTIONS: SOCKET OR FLARE.
5. WORKING PRESSURE RATING: 500 PSIG.
6. MAXIMUM OPERATING TEMPERATURE: 275 DEG F.

G. MOISTURE/LIQUID INDICATORS:
1. BODY: FORGED BRASS.
2. WINDOW: REPLACEABLE, CLEAR, FUSED GLASS WINDOW WITH INDICATING ELEMENT PROTECTED BY FILTER SCREEN.
3. INDICATOR: COLOR CODED TO SHOW MOISTURE CONTENT IN PARTS PER MILLION (PPM).
4. MINIMUM MOISTURE INDICATOR SENSITIVITY: INDICATE MOISTURE ABOVE 60 PPM.
5. END CONNECTIONS: SOCKET OR FLARE.
6. WORKING PRESSURE RATING: 500 PSIG.
7. MAXIMUM OPERATING TEMPERATURE: 240 DEG F.

H. REPLACEABLE-CORE FILTER DRYERS: COMPLY WITH AHRI 730.
1. BODY AND COVER: PAINTED-STEEL SHELL WITH DUCTILE-IRON COVER, STAINLESS-STEEL SCREWS, AND NEOPRENE GASKETS.
2. FILTER MEDIA: 10 MICRON, PLEATED WITH INTEGRAL END RINGS; STAINLESS-STEEL SUPPORT.
3. DESICCANT MEDIA: ACTIVATED ALUMINA.
4. DESIGNED FOR REVERSE FLOW (FOR HEAT-PUMP APPLICATIONS).
5. END CONNECTIONS: SOCKET.
6. ACCESS PORTS: NPS 1/4 CONNECTIONS AT ENTERING AND LEAVING SIDES FOR PRESSURE DIFFERENTIAL MEASUREMENT.
7. MAXIMUM PRESSURE LOSS: 2 PSIG.
8. WORKING PRESSURE RATING: 500 PSIG.
9. MAXIMUM OPERATING TEMPERATURE: 240 DEG F.

2.4 REFRIGERANTS

A. ASHRAE 34, R-410A: PENTAFLUOROETHANE/DIFLUOROMETHANE.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. HOT-GAS AND LIQUID LINES, AND SUCTION LINES FOR HEAT-PUMP APPLICATIONS: COPPER, TYPE ACR TYPE K TYPE L, DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH ALLOY HB BRAZED JOINTS.

B. SAFETY-RELIEF-VALVE DISCHARGE PIPING: COPPER, TYPE L, ANNEALED- OR DRAWN-TEMPER TUBING AND WROUGHT-COPPER FITTINGS WITH BRAZED JOINTS.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. INSTALL DIAPHRAGM PACKLESS VALVES IN SUCTION AND DISCHARGE LINES OF COMPRESSOR.

B. INSTALL SERVICE VALVES FOR GAGE TAPS AT INLET AND OUTLET OF HOT-GAS BYPASS VALVES AND STRAINERS IF THEY ARE NOT AN INTEGRAL PART OF VALVES AND STRAINERS.

C. INSTALL A CHECK VALVE AT THE COMPRESSOR DISCHARGE AND A LIQUID ACCUMULATOR AT THE COMPRESSOR SUCTION CONNECTION.

D. EXCEPT AS OTHERWISE INDICATED, INSTALL DIAPHRAGM PACKLESS VALVES ON INLET AND OUTLET SIDE OF FILTER DRYERS.

E. INSTALL SAFETY RELIEF VALVES WHERE REQUIRED BY 2010 ASME BOILER AND PRESSURE VESSEL CODE. PIPE SAFETY-RELIEF-VALVE DISCHARGE LINE TO OUTSIDE ACCORDING TO ASHRAE 15.

F. INSTALL MOISTURE/LIQUID INDICATORS IN LIQUID LINE AT THE INLET OF THE THERMOSTATIC EXPANSION VALVE OR AT THE INLET OF THE EVAPORATOR COIL CAPILLARY TUBE.

G. INSTALL STRAINERS UPSTREAM FROM AND ADJACENT TO THE FOLLOWING UNLESS THEY ARE FURNISHED AS AN INTEGRAL ASSEMBLY FOR THE DEVICE BEING PROTECTED:

H. INSTALL FLEXIBLE CONNECTORS AT COMPRESSORS.

3.3 PIPING INSTALLATION

A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS; INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, PUMP SIZING, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON SHOP DRAWINGS.

B. INSTALL REFRIGERANT PIPING ACCORDING TO ASHRAE 15.

C. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.

D. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.

E. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.

F. INSTALL PIPING ADJACENT TO MACHINES TO ALLOW SERVICE AND MAINTENANCE.

G. INSTALL PIPING FREE OF SAGS AND BENDS.

H. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.

I. SELECT SYSTEM COMPONENTS WITH PRESSURE RATING EQUAL TO OR GREATER THAN SYSTEM OPERATING PRESSURE.

J. INSTALL PIPING AS SHORT AND DIRECT AS POSSIBLE, WITH A MINIMUM NUMBER OF JOINTS, ELBOWS, AND FITTINGS.

K. ARRANGE PIPING TO ALLOW INSPECTION AND SERVICE OF REFRIGERATION EQUIPMENT. INSTALL VALVES AND SPECIALTIES IN ACCESSIBLE LOCATIONS TO ALLOW FOR SERVICE AND INSPECTION. INSTALL ACCESS DOORS OR PANELS AS SPECIFIED IN SECTION 083113 "ACCESS DOORS AND FRAMES" IF VALVES OR EQUIPMENT REQUIRING MAINTENANCE IS CONCEALED BEHIND FINISHED SURFACES.

L. INSTALL REFRIGERANT PIPING IN RIGID OR FLEXIBLE CONDUIT IN LOCATIONS WHERE EXPOSED TO MECHANICAL INJURY.

M. SLOPE REFRIGERANT PIPING AS FOLLOWS:
1. INSTALL HORIZONTAL HOT-GAS DISCHARGE PIPING WITH A UNIFORM SLOPE DOWNWARD AWAY FROM COMPRESSOR.
2. INSTALL HORIZONTAL SUCTION LINES WITH A UNIFORM SLOPE DOWNWARD TO COMPRESSOR.
3. INSTALL TRAPS AND DOUBLE RISERS TO ENTRAIN OIL IN VERTICAL RUNS.
4. LIQUID LINES MAY BE INSTALLED LEVEL.

N. WHEN BRAZING OR SOLDERING, REMOVE SOLENOID-VALVE COILS AND SIGHT GLASSES; ALSO REMOVE VALVE STEMS, SEATS, AND PACKING, AND ACCESSIBLE INTERNAL PARTS OF REFRIGERANT SPECIALTIES. DO NOT APPLY HEAT NEAR EXPANSION-VALVE BULB.

3.4 HANGERS AND SUPPORTS

A. INSTALL THE FOLLOWING PIPE ATTACHMENTS:
1. ADJUSTABLE STEEL CLEVIS HANGERS FOR INDIVIDUAL HORIZONTAL RUNS LESS THAN 20 FEET LONG.
2. SPRING HANGERS TO SUPPORT VERTICAL RUNS.
3. COPPER-CLAD HANGERS AND SUPPORTS FOR HANGERS AND SUPPORTS IN DIRECT CONTACT WITH COPPER PIPE.

B. INSTALL HANGERS FOR COPPER TUBING WITH THE FOLLOWING MAXIMUM SPACING AND MINIMUM ROD DIAMETERS:
1. NPS 1/2: MAXIMUM SPAN, 60 INCHES; MINIMUM ROD, 1/4 INCH.
2. NPS 5/8: MAXIMUM SPAN, 60 INCHES; MINIMUM ROD, 1/4 INCH.
3. NPS 1: MAXIMUM SPAN, 72 INCHES; MINIMUM ROD, 1/4 INCH.
4. NPS 1-1/4: MAXIMUM SPAN, 96 INCHES; MINIMUM ROD, 3/8 INCH.
5. NPS 1-1/2: MAXIMUM SPAN, 96 INCHES; MINIMUM ROD, 3/8 INCH.
6. NPS 2: MAXIMUM SPAN, 96 INCHES; MINIMUM ROD, 3/8 INCH.

3.5 FIELD QUALITY CONTROL

A. PERFORM THE FOLLOWING TESTS AND INSPECTIONS:
1. TEST REFRIGERANT PIPING, SPECIALTIES, AND RECEIVERS. ISOLATE COMPRESSOR, CONDENSER, EVAPORATOR, AND SAFETY DEVICES FROM TEST PRESSURE IF THEY ARE NOT RATED ABOVE THE TEST PRESSURE.
2. TEST HIGH- AND LOW-PRESSURE SIDE PIPING OF EACH SYSTEM SEPARATELY AT NOT LESS THAN THE PRESSURES INDICATED IN "PERFORMANCE REQUIREMENTS" ARTICLE.
   A. FILL SYSTEM WITH NITROGEN TO THE REQUIRED TEST PRESSURE.
   B. SYSTEM SHALL MAINTAIN TEST PRESSURE AT THE MANIFOLD GAGE THROUGHOUT DURATION OF TEST.
   C. TEST JOINTS AND FITTINGS WITH ELECTRONIC LEAK DETECTOR OR BY BRUSHING A SMALL AMOUNT OF SOAP AND GLYCERIN SOLUTION OVER JOINTS.
   D. REMAKE LEAKING JOINTS USING NEW MATERIALS, AND RETEST UNTIL SATISFACTORY RESULTS ARE ACHIEVED.

B. PREPARE TEST AND INSPECTION REPORTS.

3.6 SYSTEM CHARGING

A. CHARGE SYSTEM USING THE FOLLOWING PROCEDURES:
1. INSTALL CORE IN FILTER DRYERS AFTER LEAK TEST BUT BEFORE EVACUATION.
2. EVACUATE ENTIRE REFRIGERANT SYSTEM WITH A VACUUM PUMP TO 500 MICROMETERS. IF VACUUM HOLDS FOR 12 HOURS, SYSTEM IS READY FOR CHARGING.
3. BREAK VACUUM WITH REFRIGERANT GAS, ALLOWING PRESSURE TO BUILD UP TO 2 PSIG.
4. CHARGE SYSTEM WITH A NEW FILTER-DRYER CORE IN CHARGING LINE.

END OF SECTION 232300

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KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER – 10/20/2021

REVISIONS

SHEET TITLE:
SPECIFICATIONS

M5.6

SECTION 232500 – HVAC WATER TREATMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. CLEANING OF PIPING SYSTEMS.
- B. CHEMICAL FEEDER EQUIPMENT.
- C. CHEMICAL TREATMENT.

1.2 SUBMITTALS
- A. PRODUCT DATA: PROVIDE CHEMICAL TREATMENT MATERIALS, CHEMICALS, AND EQUIPMENT INCLUDING ELECTRICAL CHARACTERISTICS AND CONNECTION REQUIREMENTS.

1.3 MAINTENANCE SERVICE
- A. FURNISH SERVICE AND MAINTENANCE OF TREATMENT SYSTEMS FOR 1-YEAR FROM DATE OF SUBSTANTIAL COMPLETION.

1.4 MAINTENANCE MATERIALS
- A. PROVIDE SUFFICIENT CHEMICALS FOR TREATMENT AND TESTING DURING WARRANTY PERIOD.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
- A. CHEMICAL TREATMENT SYSTEMS PRODUCTS, AND SERVICES:
  1. BARCLAY WATER MANAGEMENT, INC., WATERTOWN, MA OFFICE.
  2. NALCO COMPANY, WINDHAM, ME OFFICE.
- B. CHEMICAL TREATMENT PRODUCTS:
  1. NU-CALGON.
  2. CULLIGAN.
  3. H-O-H WATER TECHNOLOGY, INC.
  4. WESCO CHEMICALS, INC.

2.2 MATERIALS
- A. SYSTEM CLEANER:
  1. LIQUID ALKALINE COMPOUND WITH EMULSIFYING AGENTS AND DETERGENTS TO REMOVE GREASE AND PETROLEUM PRODUCTS.
  2. BIOCIDE; CHLORINE RELEASE AGENTS SUCH AS SODIUM HYPOCHLORITE OR CALCIUM HYPOCHLORITE, OR MICROBIOCIDES SUCH AS QUARTERNARY AMMONIA COMPOUNDS, TRIBUTYL TIN OXIDE, METHYLENE BIS (THIOCYANATE), OR ISOTHIAZOLONES.
- B. CLOSED SYSTEM TREATMENT (WATER):
  1. SEQUESTERING AGENT TO REDUCE DEPOSITS AND ADJUST PH; POLYPHOSPHATE.
  2. CORROSION INHIBITORS; LIQUID BORON-NITRITE, SODIUM NITRITE AND BORAX, SODIUM TOTYLTRIAZOLE, LOW MOLECULAR WEIGHT POLYMERS, PHOSPHONATES, SODIUM MOLYBDATE, OR SULPHITES.
  3. CONDUCTIVITY ENHANCERS; PHOSPHATES OR PHOSPHONATES.

2.3 BY-PASS (POT) FEEDER
- A. MANUFACTURERS:
  1. NEPTUNE CHEMICAL PUMP CO.: MODEL DBF-5HP.
  2. GENERAL TREATMENT PRODUCTS, INC.: MODEL DB5-QC-AR.
  3. GRISWOLD WATER SYSTEMS: MODEL DB-5-GE-CS-Z-230.
  4. WHEATLEY - A DIVISION OF GLOBAL FLOW PRODUCTS: MODEL VFT-005-0.
  5. NO SUBSTITUTIONS.
- B. 5.0 GAL (18.9 L), WITH QUICK OPENING CAP (COARSE THREADED OR VICTAULIC GROOVED COUPLING TYPE), DOMED (CONVEX) TOP AND BOTTOM, FOR WORKING PRESSURE OF 200 PSIG (1370 KPA) AT 200 DEGREES F (93 DEGREES C), FITTINGS AS REQUIRED FOR PIPING CONFIGURATION INDICATED ON THE DRAWINGS, MINIMUM OF 3/4 INCH (19 MM) FPT INLET, OUTLET, AND BOTTOM DRAIN.
- C. PROVIDE FITTING FOR AIR VENT BALL VALVE, EITHER ON THE FEEDER OR ON PIPING, TO ALLOW RELEASE OF PRESSURE BEFORE OPENING THE CAP.
- D. PLUG ANY UNUSED OPENINGS.
- E. OPEN FILL FUNNEL IS NOT DESIRED. IF A FILL FUNNEL IS PROVIDED, PROVIDE A LOCKABLE BALL VALVE, AND PADLOCK WITH 3 KEYS, TO PREVENT TAMPERING. IF MORE THAN ONE LOCK IS PROVIDED, THEY SHALL BE KEYED ALIKE. FURNISH KEYS TO THE OWNER.
- F. INSTALL ABOVE THE FLOOR WITH LEGS OR PEDESTAL. FOR FEEDERS WHICH DONT HAVE INTEGRAL LEGS OR PEDESTAL, PROVIDE ADDITIONAL SUPPORT OR CONCRETE HOUSEKEEPING PAD.

PART 3 - EXECUTION

3.1 PREPARATION
- A. SYSTEMS SHALL BE OPERATIONAL, FILLED, STARTED, AND VENTED PRIOR TO CLEANING. USE WATER METER TO RECORD CAPACITY IN EACH SYSTEM.
- B. PLACE TERMINAL CONTROL VALVES IN OPEN POSITION DURING CLEANING.

3.2 CLEANING SEQUENCE
- A. CONCENTRATION:
  1. AS RECOMMENDED BY MANUFACTURER.
  2. 1 POUND PER 100 GALLONS (1 KG PER 1000 L) OF WATER CONTAINED IN THE SYSTEM.
  3. 1 POUND PER 100 GALLONS (1 KG PER 1000 L) OF WATER FOR HOT SYSTEMS AND 1 POUND PER 50 GALLONS (1 KG PER 500 L) OF WATER FOR COLD SYSTEMS.
- B. HOT WATER HEATING SYSTEMS:
  1. APPLY HEAT WHILE CIRCULATING, SLOWLY RAISING TEMPERATURE TO 160 DEGREES F (71 DEGREES C) AND MAINTAIN FOR 12 HOURS MINIMUM.
  2. REMOVE HEAT AND CIRCULATE TO 100 DEGREES F (37.8 DEGREES C) OR LESS; DRAIN SYSTEMS AS QUICKLY AS POSSIBLE AND REFILL WITH CLEAN WATER.
  3. CIRCULATE FOR 6 HOURS AT DESIGN TEMPERATURES, THEN DRAIN.
  4. REFILL WITH CLEAN WATER AND REPEAT UNTIL SYSTEM CLEANER IS REMOVED.
- C. USE NEUTRALIZER AGENTS ON RECOMMENDATION OF SYSTEM CLEANER SUPPLIER AND APPROVAL OF ARCHITECT/ENGINEER.
- D. FLUSH CLOSED SYSTEMS WITH CLEAN WATER FOR ONE HOUR MINIMUM. DRAIN COMPLETELY AND REFILL.
- E. REMOVE, CLEAN, AND REPLACE STRAINER SCREENS.
- F. INSPECT, REMOVE SLUDGE, AND FLUSH LOW POINTS WITH CLEAN WATER AFTER CLEANING PROCESS IS COMPLETED. INCLUDE DISASSEMBLY OF COMPONENTS AS REQUIRED.

3.3 INSTALLATION
- A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

3.4 CLOSED SYSTEM TREATMENT
- A. PROVIDE ONE BYPASS FEEDER ON EACH SYSTEM. INSTALL ISOLATING AND DRAIN VALVES AND NECESSARY PIPING. INSTALL AROUND BALANCING VALVE DOWNSTREAM OF CIRCULATING PUMPS UNLESS INDICATED OTHERWISE.
- B. INTRODUCE CLOSED SYSTEM TREATMENT THROUGH BYPASS FEEDER WHEN REQUIRED OR INDICATED BY TEST.

END OF SECTION 232500

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY
- A. SECTION INCLUDES:
  1. SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS.
  2. SINGLE-WALL ROUND DUCTS AND FITTINGS.
  3. SHEET METAL MATERIALS.
  4. SEALANTS AND GASKETS.
  5. HANGERS AND SUPPORTS.

1.2 PERFORMANCE REQUIREMENTS
- A. DELEGATED DUCT DESIGN: DUCT CONSTRUCTION, INCLUDING SHEET METAL THICKNESSES, SEAM AND JOINT CONSTRUCTION, REINFORCEMENTS, AND HANGERS AND SUPPORTS, SHALL COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" AND PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED IN "DUCT SCHEDULE" ARTICLE.
- B. STRUCTURAL PERFORMANCE: DUCT HANGERS AND SUPPORTS SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS DESCRIBED IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE"
- C. AIRSTREAM SURFACES: SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ASHRAE 62.1.

1.3 ACTION SUBMITTALS
- A. PRODUCT DATA: FOR EACH TYPE OF THE FOLLOWING PRODUCTS:
  1. LINERS AND ADHESIVES.
  2. SEALANTS AND GASKETS.
  3. SEISMIC-RESTRAINT DEVICES.
- B. SHOP DRAWINGS:
  1. FABRICATION, ASSEMBLY, AND INSTALLATION, INCLUDING PLANS, ELEVATIONS, SECTIONS, COMPONENTS, AND ATTACHMENTS TO OTHER WORK.
  2. FACTORY- AND SHOP-FABRICATED DUCTS AND FITTINGS.
  3. DUCT LAYOUT INDICATING SIZES, CONFIGURATION, LINER MATERIAL, AND STATIC-PRESSURE CLASSES.
  4. ELEVATION OF TOP OF DUCTS.
  5. DIMENSIONS OF MAIN DUCT RUNS FROM BUILDING GRID LINES.
  6. FITTINGS.
  7. REINFORCEMENT AND SPACING.
  8. SEAM AND JOINT CONSTRUCTION.
  9. PENETRATIONS THROUGH FIRE-RATED AND OTHER PARTITIONS.
  10. EQUIPMENT INSTALLATION BASED ON EQUIPMENT BEING USED ON PROJECT.
  11. LOCATIONS FOR DUCT ACCESSORIES, INCLUDING DAMPERS, TURNING VANES, AND ACCESS DOORS AND PANELS.
  12. HANGERS AND SUPPORTS, INCLUDING METHODS FOR DUCT AND BUILDING ATTACHMENT AND VIBRATION ISOLATION.
- C. DELEGATED-DESIGN SUBMITTAL:
  1. SHEET METAL THICKNESSES.
  2. JOINT AND SEAM CONSTRUCTION AND SEALING.
  3. REINFORCEMENT DETAILS AND SPACING.
  4. MATERIALS, FABRICATION, ASSEMBLY, AND SPACING OF HANGERS AND SUPPORTS.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS
- A. GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" BASED ON INDICATED STATIC-PRESSURE CLASS UNLESS OTHERWISE INDICATED.
- B. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 2-1, "RECTANGULAR DUCT/TRANSVERSE JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
- C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 2-2, "RECTANGULAR DUCT/LONGITUDINAL SEAMS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
- D. ELBOWS, TRANSITIONS, OFFSETS, BRANCH CONNECTIONS, AND OTHER DUCT CONSTRUCTION: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 4, "FITTINGS AND OTHER CONSTRUCTION," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS
- A. GENERAL FABRICATION REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 3, "ROUND, OVAL, AND FLEXIBLE DUCT," BASED ON INDICATED STATIC-PRESSURE CLASS UNLESS OTHERWISE INDICATED.
- B. FLAT-OVAL DUCTS: INDICATED DIMENSIONS ARE THE DUCT WIDTH (MAJOR DIMENSION) AND DIAMETER OF THE ROUND SIDES CONNECTING THE FLAT PORTIONS OF THE DUCT (MINOR DIMENSION).
- C. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-1, "ROUND DUCT TRANSVERSE JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
  1. TRANSVERSE JOINTS IN DUCTS LARGER THAN 60 INCHES IN DIAMETER: FLANGED.
- D. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-2, "ROUND DUCT LONGITUDINAL SEAMS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."
  1. FABRICATE ROUND DUCTS LARGER THAN 90 INCHES IN DIAMETER WITH BUTT-WELDED LONGITUDINAL SEAMS.
  2. FABRICATE FLAT-OVAL DUCTS LARGER THAN 72 INCHES IN WIDTH (MAJOR DIMENSION) WITH BUTT-WELDED LONGITUDINAL SEAMS.
- E. TEES AND LATERALS: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-5, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-6, "CONICAL TEES," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

2.3 SHEET METAL MATERIALS
- A. GENERAL MATERIAL REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS UNLESS OTHERWISE INDICATED. SHEET METAL MATERIALS SHALL BE FREE OF PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.
- B. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A 653M.
  1. GALVANIZED COATING DESIGNATION: G90.
  2. FINISHES FOR SURFACES EXPOSED TO VIEW: MILL PHOSPHATIZED.
- C. REINFORCEMENT SHAPES AND PLATES: ASTM A 36/A 36M, STEEL PLATES, SHAPES, AND BARS; BLACK AND GALVANIZED.
  1. WHERE BLACK- AND GALVANIZED-STEEL SHAPES AND PLATES ARE USED TO REINFORCE ALUMINUM DUCTS, ISOLATE THE DIFFERENT METALS WITH BUTYL RUBBER, NEOPRENE, OR EPDM GASKET MATERIALS.
- D. TIE RODS: GALVANIZED STEEL, 1/4-INCH MINIMUM DIAMETER FOR LENGTHS 36 INCHES OR LESS.

2.4 HANGERS AND SUPPORTS
- A. HANGER RODS FOR NONCORROSIVE ENVIRONMENTS: CADMIUM-PLATED STEEL RODS AND NUTS.
- B. HANGER RODS FOR CORROSIVE ENVIRONMENTS: ELECTROGALVANIZED, ALL-THREAD RODS OR GALVANIZED RODS WITH THREADS PAINTED WITH ZINC-CHROMATE PRIMER AFTER INSTALLATION.
- C. STRAP AND ROD SIZES: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," TABLE 5-1, "RECTANGULAR DUCT HANGERS MINIMUM SIZE," AND TABLE 5-2, "MINIMUM HANGER SIZES FOR ROUND DUCT."
- D. STEEL CABLES FOR GALVANIZED-STEEL DUCTS: GALVANIZED STEEL COMPLYING WITH ASTM A 603.
- E. STEEL CABLE END CONNECTIONS: CADMIUM-PLATED STEEL ASSEMBLIES WITH BRACKETS, SWIVEL, AND BOLTS DESIGNED FOR DUCT HANGER SERVICE; WITH AN AUTOMATIC-LOCKING AND CLAMPING DEVICE.
- F. DUCT ATTACHMENTS: SHEET METAL SCREWS, BLIND RIVETS, OR SELF-TAPPING METAL SCREWS; COMPATIBLE WITH DUCT MATERIALS.
- G. TRAPEZE AND RISER SUPPORTS:
  1. SUPPORTS FOR GALVANIZED-STEEL DUCTS: GALVANIZED-STEEL SHAPES AND PLATES.
  2. SUPPORTS FOR ALUMINUM DUCTS: ALUMINUM OR GALVANIZED STEEL COATED WITH ZINC CHROMATE.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION
- A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF DUCT SYSTEM. INDICATED DUCT LOCATIONS, CONFIGURATIONS, AND ARRANGEMENTS WERE USED TO SIZE DUCTS AND CALCULATE FRICTION LOSS FOR AIR-HANDLING EQUIPMENT SIZING AND FOR OTHER DESIGN CONSIDERATIONS. INSTALL DUCT SYSTEMS AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON SHOP DRAWINGS AND COORDINATION DRAWINGS.
- B. INSTALL DUCTS ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" UNLESS OTHERWISE INDICATED.
- C. INSTALL DUCTS IN MAXIMUM PRACTICAL LENGTHS.
- D. INSTALL DUCTS WITH FEWEST POSSIBLE JOINTS.
- E. INSTALL FACTORY- OR SHOP-FABRICATED FITTINGS FOR CHANGES IN DIRECTION, SIZE, AND SHAPE AND FOR BRANCH CONNECTIONS.
- F. UNLESS OTHERWISE INDICATED, INSTALL DUCTS VERTICALLY AND HORIZONTALLY, AND PARALLEL AND PERPENDICULAR TO BUILDING LINES.
- G. INSTALL DUCTS CLOSE TO WALLS, OVERHEAD CONSTRUCTION, COLUMNS, AND OTHER STRUCTURAL AND PERMANENT ENCLOSURE ELEMENTS OF BUILDING.
- H. INSTALL DUCTS WITH A CLEARANCE OF 1 INCH, PLUS ALLOWANCE FOR INSULATION THICKNESS.
- I. ROUTE DUCTS TO AVOID PASSING THROUGH TRANSFORMER VAULTS AND ELECTRICAL EQUIPMENT ROOMS AND ENCLOSURES.
- J. WHERE DUCTS PASS THROUGH NON-FIRE-RATED INTERIOR PARTITIONS AND EXTERIOR WALLS AND ARE EXPOSED TO VIEW, COVER THE OPENING BETWEEN THE PARTITION AND DUCT OR DUCT INSULATION WITH SHEET METAL FLANGES OF SAME METAL THICKNESS AS THE DUCT. OVERLAP OPENINGS ON FOUR SIDES BY AT LEAST 1-1/2 INCHES.
- K. PROTECT DUCT INTERIORS FROM MOISTURE, CONSTRUCTION DEBRIS AND DUST, AND OTHER FOREIGN MATERIALS.

3.2 DUCT SEALING
- A. SEAL DUCTS FOR DUCT STATIC-PRESSURE. SEAL CLASSES, AND LEAKAGE CLASSES SPECIFIED IN "DUCT SCHEDULE" ARTICLE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE."

3.3 HANGER AND SUPPORT INSTALLATION
- A. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 5, "HANGERS AND SUPPORTS."
- B. HANGER SPACING: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," TABLE 5-1, "RECTANGULAR DUCT HANGERS MINIMUM SIZE," AND TABLE 5-2, "MINIMUM HANGER SIZES FOR ROUND DUCT," FOR MAXIMUM HANGER SPACING; INSTALL HANGERS AND SUPPORTS WITHIN 24 INCHES OF EACH ELBOW AND WITHIN 48 INCHES OF EACH BRANCH INTERSECTION.
- C. HANGERS EXPOSED TO VIEW: THREADED ROD AND ANGLE OR CHANNEL SUPPORTS.
- D. SUPPORT VERTICAL DUCTS WITH STEEL ANGLES OR CHANNEL SECURED TO THE SIDES OF THE DUCT WITH WELDS, BOLTS, SHEET METAL SCREWS, OR BLIND RIVETS; SUPPORT AT EACH FLOOR AND AT A MAXIMUM INTERVALS OF 16 FEET.
- E. INSTALL UPPER ATTACHMENTS TO STRUCTURES. SELECT AND SIZE UPPER ATTACHMENTS WITH PULL-OUT, TENSION, AND SHEAR CAPACITIES APPROPRIATE FOR SUPPORTED LOADS AND BUILDING MATERIALS WHERE USED.

3.4 CONNECTIONS
- A. MAKE CONNECTIONS TO EQUIPMENT WITH FLEXIBLE CONNECTORS COMPLYING WITH SECTION 233300 "AIR DUCT ACCESSORIES."
- B. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR BRANCH, OUTLET AND INLET, AND TERMINAL UNIT CONNECTIONS.

3.5 PAINTING
- A. PAINT INTERIOR OF METAL DUCTS THAT ARE VISIBLE THROUGH REGISTERS AND GRILLES AND THAT DO NOT HAVE DUCT LINER. APPLY ONE COAT OF FLAT, BLACK, LATEX PAINT OVER A COMPATIBLE GALVANIZED-STEEL PRIMER. PAINT MATERIALS AND APPLICATION REQUIREMENTS ARE SPECIFIED IN SECTION 099113 "EXTERIOR PAINTING" AND SECTION 099123 "INTERIOR PAINTING."

3.6 DUCT CLEANING
- A. CLEAN NEW DUCT SYSTEM(S) BEFORE TESTING, ADJUSTING, AND BALANCING.
- B. USE SERVICE OPENINGS FOR ENTRY AND INSPECTION.
  1. CREATE NEW OPENINGS AND INSTALL ACCESS PANELS APPROPRIATE FOR DUCT STATIC-PRESSURE CLASS IF REQUIRED FOR CLEANING ACCESS. PROVIDE INSULATED PANELS FOR INSULATED OR LINED DUCT. PATCH INSULATION AND LINER AS RECOMMENDED BY DUCT LINER MANUFACTURER. COMPLY WITH SECTION 233300 "AIR DUCT ACCESSORIES" FOR ACCESS PANELS AND DOORS.
  2. DISCONNECT AND RECONNECT FLEXIBLE DUCTS AS NEEDED FOR CLEANING AND INSPECTION.
  3. REMOVE AND REINSTALL CEILING TO GAIN ACCESS DURING THE CLEANING PROCESS.
- C. CLEAN THE FOLLOWING COMPONENTS BY REMOVING SURFACE CONTAMINANTS AND DEPOSITS:
  1. AIR OUTLETS AND INLETS (REGISTERS, GRILLES, AND DIFFUSERS).
  2. SUPPLY, RETURN, AND EXHAUST FANS INCLUDING FAN HOUSINGS, PLENUMS (EXCEPT CEILING SUPPLY AND RETURN PLENUMS), SCROLLS, BLADES OR VANES, SHAFTS, BAFFLES, DAMPERS, AND DRIVE ASSEMBLIES.
  3. AIR-HANDLING UNIT INTERNAL SURFACES AND COMPONENTS INCLUDING MIXING BOX, COIL SECTION, AIR WASH SYSTEMS, SPRAY ELIMINATORS, CONDENSATE DRAIN PANS, HUMIDIFIERS AND DEHUMIDIFIERS, FILTERS AND FILTER SECTIONS, AND CONDENSATE COLLECTORS AND DRAINS.
  4. COILS AND RELATED COMPONENTS.
  5. RETURN-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES EXCEPT IN CEILING PLENUMS AND MECHANICAL EQUIPMENT ROOMS.
  6. SUPPLY-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
  7. DEDICATED EXHAUST AND VENTILATION COMPONENTS AND MAKEUP AIR SYSTEMS.

3.7 DUCT SCHEDULE
- A. SUPPLY DUCTS:
  1. DUCTS CONNECTED TO FAN COIL UNITS, ERV-1 AND 2:
     - A. PRESSURE CLASS: POSITIVE 2-INCH WG.
     - B. MINIMUM SMACNA SEAL CLASS: A.
     - C. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 12.
     - D. SMACNA LEAKAGE CLASS FOR ROUND AND FLAT OVAL: 12.
- B. RETURN DUCTS:
  1. DUCTS CONNECTED TO FAN COIL UNITS, ERV-1 AND 2:
     - A. PRESSURE CLASS: NEGATIVE 2-INCH WG.
     - B. MINIMUM SMACNA SEAL CLASS: A.
     - C. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 12.
     - D. SMACNA LEAKAGE CLASS FOR ROUND AND FLAT OVAL: 12.
- C. EXHAUST DUCTS:
  1. DUCTS CONNECTED TO AIR-HANDLING UNITS ERV-1 AND 2:
     - A. PRESSURE CLASS: POSITIVE OR NEGATIVE 2-INCH WG.
     - B. MINIMUM SMACNA SEAL CLASS: A IF NEGATIVE PRESSURE, AND A IF POSITIVE PRESSURE.
     - C. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 6.
     - D. SMACNA LEAKAGE CLASS FOR ROUND AND FLAT OVAL: 3.
- D. OUTDOOR-AIR (NOT FILTERED, HEATED, OR COOLED) DUCTS:
  1. DUCTS CONNECTED TO AIR-HANDLING UNITS ERV-1 AND 2:
     - A. PRESSURE CLASS: POSITIVE OR NEGATIVE 2-INCH WG.
     - B. MINIMUM SMACNA SEAL CLASS: A.
     - C. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 6.
     - D. SMACNA LEAKAGE CLASS FOR ROUND AND FLAT OVAL: 3.
- E. INTERMEDIATE REINFORCEMENT:
  1. GALVANIZED-STEEL DUCTS: GALVANIZED STEEL.
- F. ELBOW CONFIGURATION:
  1. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 4-2, "RECTANGULAR ELBOWS."
     - A. VELOCITY 1000 FPM OR LOWER:
       1) RADIUS TYPE RE 1 WITH MINIMUM 0.5 RADIUS-TO-DIAMETER RATIO.
       2) MITERED TYPE RE 4 WITHOUT VANES.
     - B. VELOCITY 1000 TO 1500 FPM:
       1) RADIUS TYPE RE 1 WITH MINIMUM 1.0 RADIUS-TO-DIAMETER RATIO.
       2) RADIUS TYPE RE 3 WITH MINIMUM 0.5 RADIUS-TO-DIAMETER RATIO AND TWO VANES.
       3) MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 4-3, "VANES AND VANE RUNNERS," AND FIGURE 4-4, "VANE SUPPORT IN ELBOWS."
     - C. VELOCITY 1500 FPM OR HIGHER:
       1) RADIUS TYPE RE 1 WITH MINIMUM 1.5 RADIUS-TO-DIAMETER RATIO.
       2) RADIUS TYPE RE 3 WITH MINIMUM 1.0 RADIUS-TO-DIAMETER RATIO AND TWO VANES.
       3) MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 4-3, "VANES AND VANE RUNNERS," AND FIGURE 4-4, "VANE SUPPORT IN ELBOWS."
  2. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 4-2, "RECTANGULAR ELBOWS."
     - A. RADIUS TYPE RE 1 WITH MINIMUM 1.5 RADIUS-TO-DIAMETER RATIO.
     - B. RADIUS TYPE RE 3 WITH MINIMUM 1.0 RADIUS-TO-DIAMETER RATIO AND TWO VANES.
     - C. MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 4-3, "VANES AND VANE RUNNERS," AND FIGURE 4-4, "VANE SUPPORT IN ELBOWS."
  3. ROUND DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-4, "ROUND DUCT ELBOWS."
     - A. MINIMUM RADIUS-TO-DIAMETER RATIO AND ELBOW SEGMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," TABLE 3-1, "MITERED ELBOWS." ELBOWS WITH LESS THAN 90-DEGREE CHANGE OF DIRECTION HAVE PROPORTIONATELY FEWER SEGMENTS.
       1) VELOCITY 1000 FPM OR LOWER: 0.5 RADIUS-TO-DIAMETER RATIO AND THREE SEGMENTS FOR 90-DEGREE ELBOW.
       2) VELOCITY 1000 TO 1500 FPM: 1.0 RADIUS-TO-DIAMETER RATIO AND FOUR SEGMENTS FOR 90-DEGREE ELBOW.
       3) VELOCITY 1500 FPM OR HIGHER: 1.5 RADIUS-TO-DIAMETER RATIO AND FIVE SEGMENTS FOR 90-DEGREE ELBOW.
       4) RADIUS-TO DIAMETER RATIO: 1.5.
- G. BRANCH CONFIGURATION:
  1. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 4-6, "BRANCH CONNECTION."
     - A. RECTANGULAR MAIN TO RECTANGULAR BRANCH: 45-DEGREE ENTRY.
     - B. RECTANGULAR MAIN TO ROUND BRANCH: SPIN IN.
  2. ROUND AND FLAT OVAL: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," FIGURE 3-5, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-6, "CONICAL TEES." SADDLE TAPS ARE PERMITTED IN EXISTING DUCT.
     - A. VELOCITY 1000 FPM OR LOWER: 90-DEGREE TAP.
     - B. VELOCITY 1000 TO 1500 FPM: CONICAL TAP.
     - C. VELOCITY 1500 FPM OR HIGHER: 45-DEGREE LATERAL.

END OF SECTION 233113

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER – 10/20/2021

REVISIONS

SHEET TITLE:

SPECIFICATIONS

M5.7

SPECIFICATIONS M5.7

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A B C D E F

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:

1. MANUAL VOLUME DAMPERS.
2. FLANGE CONNECTORS.
3. DUCT-MOUNTED ACCESS DOORS.
4. FLEXIBLE CONNECTORS.
5. DUCT ACCESSORY HARDWARE.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

PART 2 - PRODUCTS

2.1 MATERIALS

A. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A 653M.
1. GALVANIZED COATING DESIGNATION: G90.
2. EXPOSED-SURFACE FINISH: MILL PHOSPHATIZED.

B. REINFORCEMENT SHAPES AND PLATES: GALVANIZED-STEEL REINFORCEMENT WHERE INSTALLED ON GALVANIZED SHEET METAL DUCTS; COMPATIBLE MATERIALS FOR ALUMINUM AND STAINLESS-STEEL DUCTS.

C. TIE RODS: GALVANIZED STEEL, 1/4-INCH MINIMUM DIAMETER FOR LENGTHS 36 INCHES OR LESS; 3/8-INCH MINIMUM DIAMETER FOR LENGTHS LONGER THAN 36 INCHES.

2.2 MANUAL VOLUME DAMPERS

A. STANDARD, STEEL, MANUAL VOLUME DAMPERS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. GREENHECK FAN CORPORATION.
B. NAILOR INDUSTRIES INC.
C. POTTORFF.
D. RUSKIN COMPANY.
2. STANDARD LEAKAGE RATING, WITH LINKAGE OUTSIDE AIRSTREAM.
3. SUITABLE FOR HORIZONTAL OR VERTICAL APPLICATIONS.
4. FRAMES:
A. FRAME: HAT-SHAPED, 0.094-INCH-THICK, GALVANIZED SHEET STEEL.
B. MITERED AND WELDED CORNERS.
C. FLANGES FOR ATTACHING TO WALLS AND FLANGELESS FRAMES FOR INSTALLING IN DUCTS.
5. BLADES:
A. MULTIPLE OR SINGLE BLADE.
B. PARALLEL- OR OPPOSED-BLADE DESIGN.
C. STIFFEN DAMPER BLADES FOR STABILITY.
D. GALVANIZED-STEEL, 0.064 INCH THICK.
6. BLADE AXLES: GALVANIZED STEEL.
7. BEARINGS:
A. MOLDED SYNTHETIC.
B. DAMPERS IN DUCTS WITH PRESSURE CLASSES OF 3-INCH WG OR LESS SHALL HAVE AXLES FULL LENGTH OF DAMPER BLADES AND BEARINGS AT BOTH ENDS OF OPERATING SHAFT.
8. TIE BARS AND BRACKETS: GALVANIZED STEEL.

2.3 FLANGE CONNECTORS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. DUCTMATE INDUSTRIES, INC.
2. WARD INDUSTRIES; A BRAND OF HART & COOLEY, INC.

B. DESCRIPTION: ADD-ON OR ROLL-FORMED, FACTORY-FABRICATED, SLIDE-ON TRANSVERSE FLANGE CONNECTORS, GASKETS, AND COMPONENTS.

C. MATERIAL: GALVANIZED STEEL.

D. GAGE AND SHAPE: MATCH CONNECTING DUCTWORK.

2.4 DUCT-MOUNTED ACCESS DOORS

A. DUCT-MOUNTED ACCESS DOORS: FABRICATE ACCESS PANELS ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE"; FIGURES 7-2, "DUCT ACCESS DOORS AND PANELS," AND 7-3, "ACCESS DOORS - ROUND DUCT."
1. DOOR:
A. DOUBLE WALL, RECTANGULAR.
B. GALVANIZED SHEET METAL WITH INSULATION FILL AND THICKNESS AS INDICATED FOR DUCT PRESSURE CLASS.
C. VISION PANEL.
D. HINGES AND LATCHES: 1-BY-1-INCHBUTT OR PIANO HINGE AND CAM LATCHES.
E. FABRICATE DOORS AIRTIGHT AND SUITABLE FOR DUCT PRESSURE CLASS.
2. FRAME: GALVANIZED SHEET STEEL, WITH BEND-OVER TABS AND FOAM GASKETS.
3. NUMBER OF HINGES AND LOCKS:
A. ACCESS DOORS LESS THAN 12 INCHES SQUARE: NO HINGES AND TWO SASH LOCKS.
B. ACCESS DOORS UP TO 18 INCHES SQUARE: CONTINUOUS AND TWO SASH LOCKS.
C. ACCESS DOORS UP TO 24 BY 48 INCHES: CONTINUOUS AND TWO COMPRESSION LATCHES.

2.5 FLEXIBLE CONNECTORS

A. MATERIALS: FLAME-RETARDANT OR NONCOMBUSTIBLE FABRICS.

B. COATINGS AND ADHESIVES: COMPLY WITH UL 181, CLASS 1.

C. METAL-EDGED CONNECTORS: FACTORY FABRICATED WITH A FABRIC STRIP 3-1/2 INCHES WIDE ATTACHED TO TWO STRIPS OF 2-3/4-INCH-WIDE, 0.028-INCH-THICK, GALVANIZED SHEET STEEL OR 0.032-INCH-THICK ALUMINUM SHEETS. PROVIDE METAL COMPATIBLE WITH CONNECTED DUCTS.

D. INDOOR SYSTEM, FLEXIBLE CONNECTOR FABRIC: GLASS FABRIC DOUBLE COATED WITH NEOPRENE.
1. MINIMUM WEIGHT: 26 OZ./SQ. YD..
2. TENSILE STRENGTH: 480 LBF/INCH IN THE WARP AND 360 LBF/INCH IN THE FILLING.
3. SERVICE TEMPERATURE: MINUS 40 TO PLUS 200 DEG F.

E. OUTDOOR SYSTEM, FLEXIBLE CONNECTOR FABRIC: GLASS FABRIC DOUBLE COATED WITH WEATHERPROOF, SYNTHETIC RUBBER RESISTANT TO UV RAYS AND OZONE.
1. MINIMUM WEIGHT: 24 OZ./SQ. YD..
2. TENSILE STRENGTH: 530 LBF/INCH IN THE WARP AND 440 LBF/INCH IN THE FILLING.
3. SERVICE TEMPERATURE: MINUS 50 TO PLUS 250 DEG F.

2.6 DUCT ACCESSORY HARDWARE

A. INSTRUMENT TEST HOLES: CAST IRON OR CAST ALUMINUM TO SUIT DUCT MATERIAL, INCLUDING SCREW CAP AND GASKET. SIZE TO ALLOW INSERTION OF PITOT TUBE AND OTHER TESTING INSTRUMENTS AND OF LENGTH TO SUIT DUCT-INSULATION THICKNESS.

B. ADHESIVES: HIGH STRENGTH, QUICK SETTING, NEOPRENE BASED, WATERPROOF, AND RESISTANT TO GASOLINE AND GREASE.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL DUCT ACCESSORIES ACCORDING TO APPLICABLE DETAILS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR METAL DUCTS.

B. INSTALL DUCT ACCESSORIES OF MATERIALS SUITED TO DUCT MATERIALS; USE GALVANIZED-STEEL ACCESSORIES IN GALVANIZED-STEEL AND FIBROUS-GLASS DUCTS, STAINLESS-STEEL ACCESSORIES IN STAINLESS-STEEL DUCTS, AND ALUMINUM ACCESSORIES IN ALUMINUM DUCTS.

C. INSTALL VOLUME DAMPERS AT POINTS ON SUPPLY, RETURN, AND EXHAUST SYSTEMS WHERE BRANCHES EXTEND FROM LARGER DUCTS. WHERE DAMPERS ARE INSTALLED IN DUCTS HAVING DUCT LINER, INSTALL DAMPERS WITH HAT CHANNELS OF SAME DEPTH AS LINER, AND TERMINATE LINER WITH NOSING AT HAT CHANNEL.
1. INSTALL STEEL VOLUME DAMPERS IN STEEL DUCTS.

D. SET DAMPERS TO FULLY OPEN POSITION BEFORE TESTING, ADJUSTING, AND BALANCING.

E. INSTALL TEST HOLES AT FAN INLETS AND OUTLETS AND ELSEWHERE AS INDICATED.

F. INSTALL DUCT ACCESS DOORS ON SIDES OF DUCTS TO ALLOW FOR INSPECTING, ADJUSTING, AND MAINTAINING ACCESSORIES AND EQUIPMENT AT THE FOLLOWING LOCATIONS:
1. ON BOTH SIDES OF DUCT COILS.
2. AT OUTDOOR-AIR INTAKES AND MIXED-AIR PLENUMS.
3. AT DRAIN PANS AND SEALS.
4. DOWNSTREAM FROM MANUAL VOLUME DAMPERS, CONTROL DAMPERS, AND EQUIPMENT.
5. ADJACENT TO AND CLOSE ENOUGH TO FIRE OR SMOKE DAMPERS, TO RESET OR REINSTALL FUSIBLE LINKS. ACCESS DOORS FOR ACCESS TO FIRE OR SMOKE DAMPERS HAVING FUSIBLE LINKS SHALL BE PRESSURE RELIEF. ACCESS DOORS AND SHALL BE OUTWARD OPERATION FOR ACCESS DOORS INSTALLED UPSTREAM FROM DAMPERS AND INWARD OPERATION FOR ACCESS DOORS INSTALLED DOWNSTREAM FROM DAMPERS.
6. CONTROL DEVICES REQUIRING INSPECTION.

G. INSTALL ACCESS DOORS WITH SWING AGAINST DUCT STATIC PRESSURE.

H. ACCESS DOOR SIZES:
1. ONE-HAND OR INSPECTION ACCESS: 8 BY 5 INCHES.
2. TWO-HAND ACCESS: 12 BY 6 INCHES.
3. HEAD AND HAND ACCESS: 18 BY 10 INCHES.

I. LABEL ACCESS DOORS ACCORDING TO SECTION 230553 "IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT" TO INDICATE THE PURPOSE OF ACCESS DOOR.

J. INSTALL FLEXIBLE CONNECTORS TO CONNECT DUCTS TO EQUIPMENT.

K. CONNECT TERMINAL UNITS TO SUPPLY DUCTS WITH MAXIMUM 12-INCH LENGTHS OF FLEXIBLE DUCT. DO NOT USE FLEXIBLE DUCTS TO CHANGE DIRECTIONS.

L. CONNECT DIFFUSERS OR LIGHT TROFFER BOOTS TO DUCTS WITH MAXIMUM 60-INCH LENGTHS OF FLEXIBLE DUCT CLAMPED OR STRAPPED IN PLACE.

M. CONNECT FLEXIBLE DUCTS TO METAL DUCTS WITH DRAW BANDS.

N. INSTALL DUCT TEST HOLES WHERE REQUIRED FOR TESTING AND BALANCING PURPOSES.

3.2 FIELD QUALITY CONTROL

A. TESTS AND INSPECTIONS:
1. OPERATE DAMPERS TO VERIFY FULL RANGE OF MOVEMENT.
2. INSPECT LOCATIONS OF ACCESS DOORS AND VERIFY THAT PURPOSE OF ACCESS DOOR CAN BE PERFORMED.

END OF SECTION 233300

SECTION 233346 - FLEXIBLE DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. INSULATED FLEXIBLE DUCTS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. COMPLY WITH NFPA 90A, "INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS," AND WITH NFPA 90B, "INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS."

B. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS UNLESS OTHERWISE INDICATED. SHEET METAL MATERIALS SHALL BE FREE OF PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.

C. COMPLY WITH THE AIR DIFFUSION COUNCIL'S "ADC FLEXIBLE AIR DUCT TEST CODE FD 72-R1."

D. COMPLY WITH ASTM E 96/E 96M, "TEST METHODS FOR WATER VAPOR TRANSMISSION OF MATERIALS."

2.2 INSULATED FLEXIBLE DUCTS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. FLEXMASTER U.S.A., INC.
2. MCGILL AIRFLOW LLC.
3. THERMAFLEX; A FLEX-TEK GROUP COMPANY.
4. OR APPROVED EQUAL

B. INSULATED, FLEXIBLE DUCT: UL 181, CLASS 1, TWO-PLY VINYL FILM SUPPORTED BY HELICALLY WOUND, SPRING-STEEL WIRE; FIBROUS-GLASS INSULATION; ALUMINIZED VAPOR-BARRIER FILM.
1. PRESSURE RATING: 8-INCH WG POSITIVE AND 1.0-INCH WG NEGATIVE.
2. MAXIMUM AIR VELOCITY: 4000 FPM.
3. TEMPERATURE RANGE: MINUS 10 TO PLUS 160 DEG F.
4. INSULATION R-VALUE: R6.

2.3 FLEXIBLE DUCT CONNECTORS

A. CLAMPS: NYLON STRAP IN SIZES 3 THROUGH 18 INCHES, TO SUIT DUCT SIZE.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL FLEXIBLE DUCTS ACCORDING TO APPLICABLE DETAILS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR METAL DUCTS AND IN NAIMA AH116, "FIBROUS GLASS DUCT CONSTRUCTION STANDARDS," FOR FIBROUS-GLASS DUCTS.

B. INSTALL IN INDOOR APPLICATIONS ONLY. FLEXIBLE DUCTWORK SHOULD NOT BE EXPOSED TO UV LIGHTING.

C. CONNECT TERMINAL UNITS TO SUPPLY DUCTS WITH MAXIMUM 12-INCH LENGTHS OF FLEXIBLE DUCT. DO NOT USE FLEXIBLE DUCTS TO CHANGE DIRECTIONS.

D. CONNECT DIFFUSERS OR LIGHT TROFFER BOOTS TO DUCTS WITH MAXIMUM 60-INCH LENGTHS OF FLEXIBLE DUCT CLAMPED OR STRAPPED IN PLACE.

E. INSTALL DUCT TEST HOLES WHERE REQUIRED FOR TESTING AND BALANCING PURPOSES.

F. INSTALLATION:
1. INSTALL DUCTS FULLY EXTENDED.
2. DO NOT BEND DUCTS ACROSS SHARP CORNERS.
3. BENDS OF FLEXIBLE DUCTING SHALL NOT EXCEED A MINIMUM OF ONE DUCT DIAMETER.
4. AVOID CONTACT WITH METAL FIXTURES, WATER LINES, PIPES, OR CONDUITS.
5. INSTALL FLEXIBLE DUCTS IN A DIRECT LINE, WITHOUT SAGS, TWISTS, OR TURNS.

G. SUPPORTING FLEXIBLE DUCTS:
1. SUSPEND FLEXIBLE DUCTS WITH BANDS 1-1/2 INCHES WIDE OR WIDER AND SPACED A MAXIMUM OF 48 INCHES APART. MAXIMUM CENTERLINE SAG BETWEEN SUPPORTS SHALL NOT EXCEED 1/2 INCH PER 12 INCHES.
2. INSTALL EXTRA SUPPORTS AT BENDS PLACED APPROXIMATELY ONE DUCT DIAMETER FROM CENTER LINE OF THE BEND.
3. DUCTS MAY REST ON CEILING JOISTS OR TRUSS SUPPORTS. SPACING BETWEEN SUPPORTS SHALL NOT EXCEED THE MAXIMUM SPACING PER MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.
4. VERTICALLY INSTALLED DUCTS SHALL BE STABILIZED BY SUPPORT STRAPS AT A MAXIMUM OF 72 INCHES O.C.

END OF SECTION 233346

SECTION 233713.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. RECTANGULAR AND SQUARE CEILING DIFFUSERS.
2. PERFORATED DIFFUSERS.
3. LOUVER FACE DIFFUSERS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.
1. DIFFUSER SCHEDULE: INDICATE DRAWING DESIGNATION, ROOM LOCATION, QUANTITY, MODEL NUMBER, SIZE, AND ACCESSORIES FURNISHED.

PART 2 - PRODUCTS

2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. METALAIRE, INC.
2. NAILOR INDUSTRIES INC.
3. PRICE INDUSTRIES.
4. TITUS; BRAND OF JOHNSON CONTROLS INTERNATIONAL PLC, GLOBAL PRODUCTS.
5. TUTTLE & BAILEY; BRAND OF JOHNSON CONTROLS INTERNATIONAL PLC, GLOBAL PRODUCTS.

B. DEVICES SHALL BE SPECIFICALLY DESIGNED FOR VARIABLE-AIR-VOLUME FLOWS.

C. MATERIAL: ALUMINUM.

D. FINISH: BAKED ENAMEL, WHITE.

E. FACE SIZE: REFERENCE SCHEDULE SHEET FOR FACE SIZES.

F. FACE STYLE: FOUR CONE.

G. MOUNTING: T-BAR.

H. PATTERN: FIXED

2.2 PERFORATED DIFFUSERS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. KRUEGER-HVAC; BRAND OF JOHNSON CONTROLS INTERNATIONAL PLC, GLOBAL PRODUCTS.
2. NAILOR INDUSTRIES INC.
3. PRICE INDUSTRIES.
4. TITUS; BRAND OF JOHNSON CONTROLS INTERNATIONAL PLC, GLOBAL PRODUCTS.
5. TUTTLE & BAILEY; BRAND OF JOHNSON CONTROLS INTERNATIONAL PLC, GLOBAL PRODUCTS.

B. DEVICES SHALL BE SPECIFICALLY DESIGNED FOR VARIABLE-AIR-VOLUME FLOWS.

C. MATERIAL: STEEL BACKPAN AND PATTERN CONTROLLERS, WITH ALUMINUM FACE.

D. FINISH: BAKED ENAMEL, WHITE.

E. FACE SIZE: AS NOTED ON THE DRAWINGS

F. DUCT INLET: ROUND OR SQUARE.

G. FACE STYLE: FLUSH.

H. MOUNTING: T-BAR.

2.3 SOURCE QUALITY CONTROL

A. VERIFICATION OF PERFORMANCE: RATE DIFFUSERS ACCORDING TO ASHRAE 70, "METHOD OF TESTING FOR RATING THE PERFORMANCE OF AIR OUTLETS AND INLETS."

PART 3 - EXECUTION

3.1 EXAMINATION

A. EXAMINE AREAS WHERE DIFFUSERS ARE INSTALLED FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF EQUIPMENT.

B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

A. INSTALL DIFFUSERS LEVEL AND PLUMB.

B. CEILING-MOUNTED OUTLETS AND INLETS: DRAWINGS INDICATE GENERAL ARRANGEMENT OF DUCTS, FITTINGS, AND ACCESSORIES. AIR OUTLET AND INLET LOCATIONS HAVE BEEN INDICATED TO ACHIEVE DESIGN REQUIREMENTS FOR AIR VOLUME, NOISE CRITERIA, AIRFLOW PATTERN, THROW, AND PRESSURE DROP. MAKE FINAL LOCATIONS WHERE INDICATED, AS MUCH AS PRACTICAL. FOR UNITS INSTALLED IN LAY-IN CEILING PANELS, LOCATE UNITS IN THE CENTER OF PANEL. WHERE ARCHITECTURAL FEATURES OR OTHER ITEMS CONFLICT WITH INSTALLATION, NOTIFY ARCHITECT FOR A DETERMINATION OF FINAL LOCATION.

C. INSTALL DIFFUSERS WITH AIRTIGHT CONNECTIONS TO DUCTS AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, AIR EXTRACTORS, AND FIRE DAMPERS.

3.3 ADJUSTING

A. AFTER INSTALLATION, ADJUST DIFFUSERS TO AIR PATTERNS INDICATED, OR AS DIRECTED, BEFORE STARTING AIR BALANCING.

END OF SECTION 233713.13

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KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE - THOMAS W. BETTERIDGE No. 13986 LICENSED PROFESSIONAL ENGINEER - 10/20/2021

REVISIONS

SHEET TITLE:

SPECIFICATIONS

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SPECIFICATIONS M5.8

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1/8" = 1'-0" | 1/16" = 1'-0" | 3/32" = 1'-0"

A B C D E F

SECTION 235216 - CONDENSING BOILERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY

A. SECTION INCLUDES GAS-FIRED, WATER-TUBE CONDENSING BOILERS, TRIM, AND ACCESSORIES FOR GENERATING HOT WATER.

1.3 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

1. INCLUDE CONSTRUCTION DETAILS, MATERIAL DESCRIPTIONS, DIMENSIONS OF INDIVIDUAL COMPONENTS AND PROFILES, AND FINISHES FOR BOILERS.

2. INCLUDE RATED CAPACITIES, OPERATING CHARACTERISTICS, AND FURNISHED SPECIALTIES AND ACCESSORIES.

B. SUSTAINABLE DESIGN SUBMITTALS:

1. PRODUCT DATA: FOR ENERGY PERFORMANCE.

C. SHOP DRAWINGS: FOR BOILERS, BOILER TRIM, AND ACCESSORIES.

1. INCLUDE PLANS, ELEVATIONS, SECTIONS, AND MOUNTING DETAILS.

2. INCLUDE DETAILS OF EQUIPMENT ASSEMBLIES. INDICATE DIMENSIONS, WEIGHTS, LOADS, REQUIRED CLEARANCES, METHOD OF FIELD ASSEMBLY, COMPONENTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.

3. INCLUDE DIAGRAMS FOR POWER, SIGNAL, AND CONTROL WIRING.

1.4 INFORMATIONAL SUBMITTALS

A. SOURCE QUALITY-CONTROL REPORTS.

B. FIELD QUALITY-CONTROL REPORTS.

C. SAMPLE WARRANTY: FOR SPECIAL WARRANTY.

D. OTHER INFORMATIONAL SUBMITTALS:

1. ASME STAMP CERTIFICATION AND REPORT: SUBMIT "A," "S," OR "PP" STAMP CERTIFICATE OF AUTHORIZATION, AS REQUIRED BY AUTHORITIES HAVING JURISDICTION, AND DOCUMENT HYDROSTATIC TESTING OF PIPING EXTERNAL TO BOILER.

1.5 CLOSEOUT SUBMITTALS

A. OPERATION AND MAINTENANCE DATA: FOR BOILERS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS.

1.6 WARRANTY

A. MANUFACTURER'S WARRANTY: MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF BOILERS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.

1. WARRANTY PERIOD FOR NEOTHERM WATER-TUBE CONDENSING BOILERS: 12 YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

A. HEAT EXCHANGER DAMAGED BY THERMAL SHOCK: 12 YEARS FROM DATE OF INSTALLATION, OR SIX MONTHS AFTER DATE OF MANUFACTURE, WHICHEVER IS FIRST.

B. HEAT EXCHANGER CORROSION: NONPRORATED FOR FIVE YEARS AND PRORATED SIX THROUGH TEN YEARS FROM DATE OF INSTALLATION OR SIX MONTHS AFTER DATE OF MANUFACTURE, WHICHEVER IS FIRST.

C. PARTS: TO BE FREE FROM MANUFACTURING DEFECTS IN MATERIAL AND WORKMANSHIP FOR ONE YEAR FROM DATE OF INSTALLATION OR SIX MONTHS AFTER DATE OF MANUFACTURE, WHICHEVER IS FIRST.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.

B. ASME COMPLIANCE: FABRICATE AND LABEL BOILERS, ASME H STAMP, TO COMPLY WITH THE LATEST EDITION OF THE ASME BOILER AND PRESSURE VESSEL CODE.

C. ASHRAE/IES 90.1 COMPLIANCE: BOILERS SHALL HAVE MINIMUM EFFICIENCY ACCORDING TO "GAS AND OIL FIRED BOILERS - MINIMUM EFFICIENCY REQUIREMENTS."

D. DOE COMPLIANCE:

1. BOILER THERMAL AND COMBUSTION EFFICIENCIES SHALL BE CERTIFIED AND LISTED BY AHRI.

E. MOUNTING BASE: FOR SECURING BOILER TO CONCRETE BASE.

2.2 WATER-TUBE CONDENSING BOILERS

A. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE LAARS HEATING SYSTEMS COMPANY; NEOTHERM BOILER OR COMPARABLE PRODUCT BY ONE OF THE FOLLOWING:

1. RAYPAK, INC.

2. RBI; A DIVISION OF MESTEK, INC.

3. THERMAL SOLUTIONS LLC.

4. OR APPROVED EQUAL

B. DESCRIPTION: FACTORY-FABRICATED, -ASSEMBLED, AND -TESTED, STAINLESS STEEL, WATER-TUBE CONDENSING BOILER WITH HEAT EXCHANGER SEALED PRESSURE TIGHT, BUILT ON A STEEL BASE, INCLUDING POWDER COAT, THERMAL SET JACKET; FLUE-GAS VENT; COMBUSTION-AIR INTAKE CONNECTIONS; WATER SUPPLY, RETURN, AND CONDENSATE DRAIN CONNECTIONS; AND CONTROLS.

C. HEAT EXCHANGER: STAINLESS-STEEL HEAT EXCHANGERS.

D. COMBUSTION CHAMBER: STAINLESS STEEL, SEALED.

E. BURNER: PROPANE GAS, FORCED DRAFT DRAWING FROM GAS PREMIXING VALVE.

F. BLOWER: OPERATES DURING BURNER FIRING SEQUENCE, PREPURGE AND POSTPURGE OF THE COMBUSTION CHAMBER.

G. GAS TRAIN: EQUIPPED WITH A ZERO-GOVERNING, NEGATIVE REGULATOR VALVE AND MANUAL SHUTOFF VALVE.

H. IGNITION: SPARK IGNITION, WITH SINGLE ROD FLAME SENSOR, THAT INCLUDES FLAME SAFETY SUPERVISION AND 100 PERCENT MAIN-VALVE SHUTOFF.

I. CASING:

1. JACKET: SHEET METAL, WITH SNAP-IN, MECHANICALLY FASTENED, AND/OR INTERLOCKING CLOSURES.

2. CONTROL COMPARTMENT ENCLOSURES: INTEGRAL TO BOILER JACKET.

3. FINISH: THERMAL SET POWDER COAT PAINT WITH TEXTURED FINISH.

4. COMBUSTION-AIR CONNECTIONS: INLET AIR DUCT COLLARS.

J. CAPACITIES AND CHARACTERISTICS:

1. HEATING MEDIUM: HOT WATER.

2. DESIGN WATER-PRESSURE RATING: 160 PSIG.

3. SAFETY RELIEF VALVE SETTING: 75 PSIG.

4. ENTERING-WATER TEMPERATURE: MINIMUM 40 DEG F.

5. LEAVING-WATER TEMPERATURE: MAXIMUM 195 DEG F.

6. SUSTAINABLE DESIGN SYSTEMS REQUIRE COMPLIANCE WITH ASHRAE/IES 90.1 AND MAY REQUIRE EFFICIENCY IN EXCESS OF MINIMUM EFFICIENCY REQUIRED BY ASHRAE/IES 90.1.

7. ELECTRICAL CHARACTERISTICS:

A. VOLTS: 110/120-V AC.

B. PHASE: SINGLE.

C. HERTZ: 60 HZ.

D. MAXIMUM OVERCURRENT PROTECTION: 15-A.

2.3 TRIM

A. BOILER CONTROLLERS:

1. MODULATING, OPERATING.

2. IGNITION.

3. MANUAL RESET HIGH LIMIT.

4. AUTOMATIC RESET HIGH LIMIT.

B. SAFETY RELIEF VALVE: ASME RATED.

C. PRESSURE AND TEMPERATURE GAGE: MINIMUM 3-1/2-INCH-DIAMETER, COMBINATION WATER-PRESSURE AND -TEMPERATURE GAGE IN COMPLIANCE WITH ASME PRESSURE VESSEL CODE.

D. BOILER AIR VENT: MANUAL.

E. DRAIN VALVE: MINIMUM NPS ¾ VALVE IN COMPLIANCE WITH ASME PRESSURE VESSEL CODE.

F. CONDENSATE TRAP: PRIMELESS CONDENSATE TRAP WITH OVERFLOW PROTECTION.

G. LOW WATER CUTOFF WITH MANUAL RESET AND TEST BUTTON

H. HIGH PRESSURE SWITCH WITH MANUAL RESET

I. AIR FILTER

J. OPTIONS - BOILER MOUNTED:

1. LOW WATER CUTOFF WITH MANUAL RESET AND TEST BUTTON

2. ADDITIONAL AUTO RESET HIGH LIMIT,

3. HIGH/LOW GAS PRESSURE SWITCHES,

4. ALTERNATE RELIEF VALVES.

K. OPTIONS - FIELD INSTALLED.

1. CONDENSATE NEUTRALIZER KIT.

2. BOILER PUMP

2.4 CONTROLS

A. REFER TO DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC AND SEQUENCE OF OPERATIONS FOR HVAC DDC.

B. BOILER OPERATING CONTROLS SHALL INCLUDE THE FOLLOWING DEVICES AND FEATURES:

1. INTEGRATED COLOR TOUCH SCREEN USER INTERFACE.

2. LARGE COLOR TOUCH SCREEN USER INTERFACE.

A. INCLUDES CLEANING MODE THAT ALLOWS USER TO CLEAN THE SCREEN WITHOUT ACTIVATING TOUCH SCREEN.

3. LARGE LCD DISPLAY WITH TOUCHPAD USER INTERFACE.

4. QUICK START MENU OPTION.

5. CONTROL TRANSFORMER.

6. MAXIMUM VENT TEMPERATURE CUTOFF.

7. DRY ALARM CONTACTS FOR IGNITION FAILURE.

8. MANUAL RESET HIGH LIMIT STOPS BURNER IF OPERATING CONDITIONS RISE ABOVE MAXIMUM BOILER DESIGN TEMPERATURE.

9. ON/OFF TOGGLE SWITCH, LIGHTED.

10. ADJUSTABLE SET POINTS.

A. BOILER TEMPERATURE.

B. BOILER HIGH LIMIT.

C. DEG F OR DEG C DISPLAY.

D. PID GAIN PARAMETERS.

E. MANUAL FIRING RATE CONTROL (FORCED MIN OR MAX FIRING RATE).

F. PUMP EXERCISE MODE.

G. ANTI-SHORT CYCLE.

11. SPARK TO PILOT IGNITION.

12. DIRECT SPARK IGNITION.

13. 24-V CONTROL CIRCUIT.

14. ACCEPTS 4-20 MA OR 0-10 V MODULATION SIGNAL FROM EXTERNAL CONTROL OR BUILDING AUTOMATION SYSTEM, WITH AUTOMATIC REMOTE SIGNAL DETECTION.

15. OUTDOOR RESET:

A. CUSTOMIZABLE RESET CURVES BASED ON OUTDOOR TEMPERATURES AND DESIRED SYSTEM WATER TEMPERATURE.

B. WARM WEATHER SHUTDOWN.

C. OUTDOOR AIR TEMPERATURE SENSOR INCLUDED.

1) OUTDOOR TEMPERATURE DISPLAYED.

2) SYSTEM TEMPERATURE DISPLAYED.

16. THREE LEVELS OF PASSWORD PROTECTION:

A. USER LEVEL.

B. INSTALLER LEVEL.

C. OEM LEVEL.

17. INFORMATION AVAILABLE FROM MODBUS CONNECTION:

A. INLET WATER TEMPERATURE.

B. OUTLET WATER TEMPERATURE.

C. FLUE GAS TEMPERATURE.

D. SYSTEM TEMPERATURE.

E. FROST PROTECTION.

F. WARM WEATHER SHUTDOWN.

G. STATUS FOR ALL SENSORS.

H. FAN SPEED.

I. ALL SETPOINTS.

J. REMOTE CONTROL INPUT.

K. BURNER STATUS.

L. LOCKOUT CODES.

M. ALARM REASONS.

N. DOMESTIC WATER PUMP STATUS.

O. BOILER PUMP STATUS.

18. CONTROL DIAGNOSTICS SHALL INCLUDE:

A. IGNITION FAILURE.

B. GROUNDED FLAME ROD.

C. SAFETY CHAIN INTERRUPT.

D. BOILER HIGH LIMIT EXCEEDED.

E. DOMESTIC WATER HIGH LIMIT EXCEEDED.

F. TEMPERATURE RISE LIMIT EXCEEDED.

G. FLUE GAS TEMPERATURE LIMIT EXCEEDED.

H. PRESSURE SENSOR FAULT.

I. COMBUSTION PRESSURE FAULT.

J. BLOCKED AIR INTAKE.

K. SENSOR ERRORS (OPEN OR SHORT).

L. CONTROL VOLTAGE HIGH OR LOW.

M. MODULATION FAULT.

N. PUMP FAULT.

O. AC INPUT PHASES REVERSED.

P. FAN SPEED PROVING RATE FAILURE.

19. CONTROL SHALL HAVE A CLOCK WITH BATTERY BACKUP AND RUNTIME INDICATORS FOR:

A. BURNER RUNTIME.

B. BURNER CYCLE COUNT.

C. BOILER PUMP.

D. SYSTEM PUMP.

20. THE CONTROL SHALL DIFFERENTIATE BETWEEN A LOCKOUT, A HOLD, OR AN ALERT. IF AN ISSUE OCCURS, THE SYSTEM WILL DISPLAY A BRIEF DESCRIPTION OF THE ISSUE ON THE CONTROL SCREEN. THE USER SHALL BE ABLE TO TAP THE DISPLAY TO BE PRESENTED WITH A MORE DETAILED EXPLANATION OF THE ISSUE.

C. BURNER OPERATING CONTROLS: TO MAINTAIN SAFE OPERATING CONDITIONS, BURNER SAFETY CONTROLS LIMIT BURNER OPERATION.

1. BURNER OPERATING CONTROL SHALL BE INTEGRAL TO THE BOILER CONTROL.

2. HARDWIRED POINTS:

A. MONITORING: ON/OFF STATUS, COMMON TROUBLE ALARM LOW-WATER-LEVEL ALARM.

B. CONTROL: ON/OFF OPERATION, HOT-WATER-SUPPLY TEMPERATURE SET-POINT ADJUSTMENT.

2.5 ELECTRICAL POWER

A. CONTROLLERS, ELECTRICAL DEVICES, AND WIRING: ELECTRICAL DEVICES AND CONNECTIONS ARE SPECIFIED IN ELECTRICAL SECTIONS.

B. SINGLE-POINT FIELD POWER CONNECTION: FACTORY-INSTALLED AND -WIRED SWITCHES, MOTOR CONTROLLERS, TRANSFORMERS, AND OTHER ELECTRICAL DEVICES NECESSARY SHALL PROVIDE A SINGLE-POINT FIELD POWER CONNECTION TO BOILER.

1. HOUSE IN NEMA 250, TYPE 1 ENCLOSURE.

2. WIRING SHALL BE NUMBERED AND COLOR CODED TO MATCH WIRING DIAGRAM.

3. INSTALL FACTORY WIRING OUTSIDE OF AN ENCLOSURE IN A METAL RACEWAY.

4. FIELD POWER INTERFACE SHALL BE TO NONFUSED DISCONNECT SWITCH.

5. PROVIDE BRANCH POWER CIRCUIT TO EACH MOTOR AND TO CONTROLS WITH A DISCONNECT SWITCH OR CIRCUIT BREAKER.

6. PROVIDE EACH MOTOR WITH OVERCURRENT PROTECTION.

2.6 VENTING KITS

A. KIT: COMPLETE SYSTEM, INCLUDING PIPE, VENT TERMINAL, THIMBLE, INDOOR PLATE, VENT ADAPTER, CONDENSATE TRAP AND DILUTION TANK, AND SEALANT. ALLOWABLE MATERIALS:

1. STAINLESS STEEL, UL 1738.

2. CPVC SCH 40, ANSI/ASTM F 441.

3. POLYPROPYLENE, ULC-S636.

B. COMBUSTION-AIR INTAKE: COMPLETE SYSTEM, INCLUDING PIPE, AIR TERMINAL WITH SCREEN, INLET AIR COUPLING, AND SEALANT. ALLOWABLE MATERIALS:

1. STAINLESS STEEL, UL 1738.

2. CPVC SCH 40, ANSI/ASTM F 441.

3. POLYPROPYLENE, ULC-S636.

2.7 SOURCE QUALITY CONTROL

A. BURNER AND HYDROSTATIC TEST: FACTORY ADJUST BURNER TO ELIMINATE EXCESS OXYGEN, CARBON DIOXIDE, OXIDES OF NITROGEN EMISSIONS, AND CARBON MONOXIDE IN FLUE GAS AND TO ACHIEVE COMBUSTION EFFICIENCY; PERFORM HYDROSTATIC TEST.

B. TEST AND INSPECT FACTORY-ASSEMBLED BOILERS, BEFORE SHIPPING, ACCORDING TO THE LATEST EDITION OF ASME BOILER AND PRESSURE VESSEL CODE.

C. ASSEMBLED BOILER MUST BE FACTORY TESTED FOR SAFETY AND FUNCTIONALITY; BOILER FILLED WITH WATER, FIRED THROUGHOUT FIRING RANGE, WITH ALL BURNER SAFETY COMPONENTS PROVEN. RESULTS RECORDED FOR FUTURE REFERENCE.

PART 3 - EXECUTION

3.1 EXAMINATION

A. EXAMINE ROUGHING-IN FOR CONCRETE EQUIPMENT BASES, ANCHOR-BOLT SIZES AND LOCATIONS, AND PIPING AND ELECTRICAL CONNECTIONS TO VERIFY ACTUAL LOCATIONS, SIZES, AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.

1. FINAL BOILER LOCATIONS INDICATED ON DRAWINGS ARE APPROXIMATE. DETERMINE EXACT LOCATIONS BEFORE ROUGHING-IN FOR PIPING AND ELECTRICAL CONNECTIONS.

B. EXAMINE MECHANICAL SPACES FOR SUITABLE CONDITIONS WHERE BOILERS WILL BE INSTALLED.

C. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 BOILER INSTALLATION

A. EQUIPMENT MOUNTING:

1. INSTALL BOILERS ON CAST-IN-PLACE CONCRETE EQUIPMENT BASE(S). COMPLY WITH REQUIREMENTS FOR EQUIPMENT BASES AND FOUNDATIONS.

B. INSTALL GAS-FIRED BOILERS ACCORDING TO NFPA 54.

C. ASSEMBLE AND INSTALL ANY OPTIONAL BOILER TRIM.

D. INSTALL ELECTRICAL DEVICES FURNISHED WITH BOILER BUT NOT SPECIFIED TO BE FACTORY MOUNTED.

E. INSTALL CONTROL WIRING TO FIELD-MOUNTED ELECTRICAL DEVICES.

3.3 CONNECTIONS

A. PIPING INSTALLATION REQUIREMENTS ARE SPECIFIED IN OTHER SECTIONS. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.

B. INSTALL PIPING ADJACENT TO BOILER TO ALLOW SERVICE AND MAINTENANCE.

C. INSTALL PIPING FROM EQUIPMENT DRAIN CONNECTION TO NEAREST FLOOR DRAIN. PIPING SHALL BE AT LEAST FULL SIZE OF CONNECTION. PROVIDE AN ISOLATION VALVE IF REQUIRED.

D. CONNECT PIPING TO BOILERS, EXCEPT SAFETY RELIEF VALVE CONNECTIONS, WITH FLEXIBLE CONNECTORS OF MATERIALS SUITABLE FOR SERVICE. FLEXIBLE CONNECTORS AND THEIR INSTALLATION ARE SPECIFIED IN SECTION 232116 "HYDRONIC PIPING SPECIALTIES."

E. CONNECT GAS PIPING TO BOILER GAS-TRAIN INLET WITH UNION. PIPING SHALL BE AT LEAST FULL SIZE OF GAS-TRAIN CONNECTION. PROVIDE A REDUCER IF REQUIRED.

F. CONNECT HOT-WATER PIPING TO SUPPLY- AND RETURN-BOILER TAPPINGS WITH SHUTOFF VALVE AND UNION OR FLANGE AT EACH CONNECTION.

G. INSTALL PIPING FROM SAFETY RELIEF VALVES TO NEAREST FLOOR DRAIN.

H. BOILER VENTING:

1. INSTALL FLUE VENTING KIT AND COMBUSTION-AIR INTAKE.

I. GROUND EQUIPMENT ACCORDING TO SECTION 260526 "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS."

3.4 FIELD QUALITY CONTROL

A. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TEST AND INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS.

B. PERFORM THE FOLLOWING TESTS AND INSPECTIONS WITH THE ASSISTANCE OF A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE:

1. PERFORM INSTALLATION AND STARTUP CHECKS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

2. LEAK TEST: HYDROSTATIC TEST. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST.

3. OPERATIONAL TEST: START UNITS TO CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATION. ADJUST AIR-FUEL RATIO AND COMBUSTION.

4. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.

A. CHECK AND ADJUST INITIAL OPERATING SET POINTS AND HIGH- AND LOW-LIMIT SAFETY SET POINTS OF FUEL SUPPLY, WATER LEVEL, AND WATER TEMPERATURE.

B. SET FIELD-ADJUSTABLE SWITCHES AND CIRCUIT-BREAKER TRIP RANGES AS INDICATED.

C. BOILER WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.

D. PREPARE TEST AND INSPECTION REPORTS.

E. OCCUPANCY ADJUSTMENTS: WHEN REQUESTED WITHIN 12 MONTHS OF DATE OF SUBSTANTIAL COMPLETION, PROVIDE ON-SITE ASSISTANCE IN ADJUSTING SYSTEM TO SUIT ACTUAL OCCUPIED CONDITIONS. PROVIDE UP TO TWO VISITS TO PROJECT DURING OTHER-THAN-NORMAL OCCUPANCY HOURS FOR THIS PURPOSE.

F. PERFORMANCE TESTS:

1. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENT ASSEMBLIES AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND TO CONDUCT PERFORMANCE TESTING.

2. BOILERS SHALL COMPLY WITH PERFORMANCE REQUIREMENTS INDICATED, AS DETERMINED BY FIELD PERFORMANCE TESTS. ADJUST, MODIFY, OR REPLACE EQUIPMENT TO COMPLY.

3. PERFORM FIELD PERFORMANCE TESTS TO DETERMINE CAPACITY AND EFFICIENCY OF BOILERS.

A. TEST FOR FULL CAPACITY.

B. TEST FOR BOILER EFFICIENCY AT LOW FIRE 20, 40, 60, 80, 100, 80, 60, 40, AND 20 PERCENT OF FULL CAPACITY. DETERMINE EFFICIENCY AT EACH TEST POINT.

4. REPEAT TESTS UNTIL RESULTS COMPLY WITH REQUIREMENTS INDICATED.

5. PROVIDE ANALYSIS EQUIPMENT REQUIRED TO DETERMINE PERFORMANCE.

6. PROVIDE TEMPORARY EQUIPMENT AND SYSTEM MODIFICATIONS NECESSARY TO DISSIPATE THE HEAT PRODUCED DURING TESTS IF BUILDING SYSTEMS ARE INADEQUATE.

7. NOTIFY ARCHITECT 24 HOURS MINIMUM IN ADVANCE OF TEST DATES.

8. DOCUMENT TEST RESULTS IN A REPORT AND SUBMIT TO ARCHITECT.

3.5 DEMONSTRATION

A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, AND MAINTAIN BOILERS.

END OF SECTION 235216

TURNER GROUP

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KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE - THOMAS W. BETTERIDGE No. 13988 LICENSED - PROFESSIONAL ENGINEER
10/20/2021

REVISIONS

SHEET TITLE:

SPECIFICATIONS

M5.9

SPECIFICATIONS M5.9

1/8" = 1'-0" 3/32" = 1'-0" 1/16" = 1'-0"

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SECTION 238130 - VARIABLE-REFRIGERANT-FLOW AIR CONDITIONING SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION
A. VARIABLE CAPACITY, VARIABLE REFRIGERANT FLOW HEAT PUMP AND AIR CONDITIONING SPLIT SYSTEMS.

1.2 QUALITY ASSURANCE
A. MANUFACTURER'S QUALIFICATIONS: COMPANY SPECIALIZING IN MANUFACTURING THE PRODUCTS SPECIFIED IN THIS SECTION WITH MINIMUM 3 YEARS' EXPERIENCE.
B. INSTALLER QUALIFICATIONS: COMPANY SPECIALIZING IN PERFORMING THE WORK OF THIS SECTION WITH MINIMUM 3 YEARS' EXPERIENCE.
C. THE UNITS SHALL BE LISTED BY ELECTRICAL LABORATORIES (ETL) AND BEAR THE ETL LABEL.
D. WIRING SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC).
E. THE OUTDOOR UNIT WILL BE FACTORY CHARGED WITH R410A.

1.3 WARRANTY
A. MANUFACTURER'S WARRANTY FOR A PERIOD OF 1 YEAR FROM DATE OF INSTALLATION. LIMITED LABOR WARRANTY FOR A PERIOD OF 1 YEAR FROM DATE OF INSTALLATION. COMPRESSOR WARRANTY: 6 YEARS FROM DATE OF INSTALLATION. DURING THE STATED PERIOD, SHOULD ANY PART FAIL DUE TO DEFECTS IN MATERIAL AND WORKMANSHIP, IT SHALL BE REPAIRED OR REPLACED AT THE DISCRETION OF THE MANUFACTURER.

1.4 INSTALLATION REQUIREMENTS
A. THE SYSTEM MUST BE INSTALLED BY A FACTORY-TRAINED CONTRACTOR/DEALER.

1.5 DELIVERY, STORAGE AND HANDLING
A. UNIT SHALL BE STORED AND HANDLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION
A. MANUFACTURERS:
1. TRANE - MITSUBISHI.
2. DAIKIN, DISTRIBUTED BY DXS NEW ENGLAND.
3. OR APPROVED EQUAL.
OUTDOOR UNIT
B. GENERAL: THE OUTDOOR UNIT IS DESIGNED SPECIFICALLY FOR USE WITH VRF SERIES COMPONENTS.
1. THE OUTDOOR UNIT SHALL BE FACTORY ASSEMBLED AND PRE-WIRED WITH NECESSARY ELECTRONIC AND REFRIGERANT CONTROLS. THE REFRIGERATION CIRCUIT OF THE CONDENSING UNIT SHALL CONSIST OF SCROLL COMPRESSOR, MOTORS, FANS, CONDENSER COIL, ELECTRONIC EXPANSION VALVE, SOLENOID VALVES, 4 WAY VALVE, DISTRIBUTION HEADERS, CAPILLARIES, FILTERS, SHUT OFF VALVES, OIL SEPARATORS, SERVICE PORTS, LIQUID RECEIVERS AND ACCUMULATORS.
2. BOTH LIQUID AND SUCTION LINES MUST BE INDIVIDUALLY INSULATED BETWEEN THE OUTDOOR AND INDOOR UNITS.
3. THE OUTDOOR UNIT CAN BE WIRED AND PIPED WITH OUTDOOR UNIT ACCESS FROM LEFT, RIGHT, REAR OR BOTTOM.
4. THE CONNECTION RATIO OF INDOOR UNITS TO OUTDOOR UNIT WILL BE 50 PERCENT TO 130 PERCENT.
5. THE SOUND PRESSURE DB(A) AT RATED CONDITIONS SHALL BE A VALUE OF 58 DECIBELS AT 3 FEET FROM THE FRONT OF THE UNIT. THE OUTDOOR UNIT SHALL BE CAPABLE OF OPERATING AT FURTHER REDUCED NOISE DURING NIGHT TIME.
6. THE SYSTEM WILL AUTOMATICALLY RESTART OPERATION AFTER A POWER FAILURE AND WILL NOT CAUSE ANY SETTINGS TO BE LOST, THUS ELIMINATING THE NEED FOR RE-PROGRAMMING.
7. THE OUTDOOR UNIT SHALL BE MODULAR IN DESIGN AND SHOULD ALLOW FOR SIDE-BY-SIDE INSTALLATION WITH MINIMUM SPACING.
8. THE FOLLOWING SAFETY DEVICES SHALL BE INCLUDED ON THE CONDENSING UNIT; HIGH PRESSURE SWITCH, CONTROL CIRCUIT FUSES, CRANKCASE HEATERS, FUSIBLE PLUG, HIGH PRESSURE SWITCH, OVERLOAD RELAY, INVERTER OVERLOAD PROTECTOR, THERMAL PROTECTORS FOR COMPRESSOR AND FAN MOTORS, OVER CURRENT PROTECTION FOR THE INVERTER AND ANTI-RECYCLING TIMERS. TO ENSURE THE LIQUID REFRIGERANT DOES NOT FLASH WHEN SUPPLYING TO THE VARIOUS FAN COIL UNITS, THE CIRCUIT SHALL BE PROVIDED WITH A SUB-COOLING FEATURE. OIL RECOVERY CYCLE SHALL BE AUTOMATIC OCCURRING 1 HOUR AFTER START OF OPERATION AND THEN EVERY 6 HOURS OF OPERATION.
C. UNIT CABINET:
1. THE OUTDOOR UNIT SHALL BE COMPLETELY WEATHER PROOF AND CORROSION RESISTANT. THE UNIT SHALL BE CONSTRUCTED FROM RUST-PROOFED MILD STEEL PANELS COATED WITH A BAKED ENAMEL FINISH.
D. FAN:
1. THE CONDENSING UNIT SHALL CONSIST OF ONE PROPELLER TYPE, DIRECT-DRIVE FAN MOTORS THAT HAVE MULTIPLE SPEED OPERATION VIA A DC INVERTER.
2. THE CONDENSING UNIT FAN MOTOR SHALL HAVE MULTIPLE SPEED OPERATION OF THE DC INVERTER TYPE, AND BE OF HIGH EXTERNAL STATIC PRESSURE AND SHALL BE FACTORY SET AS STANDARD.
3. THE FAN MOTOR SHALL HAVE INHERENT PROTECTION AND PERMANENTLY LUBRICATED BEARINGS AND BE MOUNTED.
4. THE FAN MOTOR SHALL BE PROVIDED WITH A FAN GUARD TO PREVENT CONTACT WITH MOVING PARTS.
E. CONDENSER COIL:
1. THE CONDENSER COIL SHALL BE MANUFACTURED FROM COPPER TUBES EXPANDED INTO ALUMINUM FINS TO FORM A MECHANICAL BOND.
2. THE COIL SHALL BE OF A WAFFLE LOUVER FIN AND HIGH HEAT EXCHANGER, RIFLED BORE TUBE DESIGN TO ENSURE HIGHLY EFFICIENT PERFORMANCE.
F. COMPRESSOR:
1. THE SCROLL COMPRESSOR SHALL BE VARIABLE SPEED CONTROLLED WHICH IS CAPABLE OF CHANGING THE SPEED TO FOLLOW THE VARIATIONS IN TOTAL COOLING LOAD AS DETERMINED BY THE SUCTION GAS PRESSURE AS MEASURED IN THE CONDENSING UNIT.
2. THE COMPRESSOR IN EACH CONDENSING UNIT SHALL BE OF HIGHLY EFFICIENT RELUCTANCE DC, HERMETICALLY SEALED SCROLL TYPE.
3. THE CAPACITY CONTROL RANGE SHALL BE 14 PERCENT TO 100 PERCENT, WITH INDIVIDUAL CAPACITY STEPS. EACH NON-INVERTER COMPRESSOR SHALL ALSO BE OF THE HERMETICALLY SEALED SCROLL TYPE.
4. EACH COMPRESSOR SHALL BE EQUIPPED WITH A CRANKCASE HEATER, HIGH PRESSURE SAFETY SWITCH, AND INTERNAL THERMAL OVERLOAD PROTECTOR.
5. OIL SEPARATORS SHALL BE STANDARD WITH THE EQUIPMENT TOGETHER WITH AN OIL BALANCING CIRCUIT.
6. THE COMPRESSOR SHALL BE MOUNTED TO AVOID THE TRANSMISSION OF VIBRATION.
G. ELECTRICAL:
1. THE POWER SUPPLY TO THE OUTDOOR UNIT SHALL BE AS SCHEDULED.
2. THE CONTROL VOLTAGE BETWEEN THE INDOOR AND OUTDOOR UNIT SHALL BE 16VDC NON-SHIELDED 2 CONDUCTOR CABLE.
3. THE CONTROL WIRING SHALL BE A TWO-WIRE MULTIPLEX TRANSMISSION SYSTEM, MAKING IT POSSIBLE TO CONNECT MULTIPLE INDOOR UNITS TO ONE OUTDOOR UNIT WITH ONE 2-CABLE WIRE, THUS SIMPLIFYING THE WIRING OPERATION.
4. THE CONTROL WIRING LENGTHS SHALL CONFORM WITH THE MANUFACTURER'S REQUIREMENTS.

2.2 INDOOR UNIT – CEILING CASSETTE UNIT
A. PERFORMANCE: AS SPECIFIED ON DRAWINGS.
B. INDOOR UNIT:
1. INDOOR UNIT MODEL SHALL BE A CEILING CASSETTE FAN COIL UNIT WITH A VARIABLE SPEED DIRECT DRIVE DC TYPE FAN FOR INSTALLATION INTO THE CEILING CAVITY, EQUIPPED WITH AN AIR PANEL GRILL. IT SHALL BE A FOUR-WAY AIR DISTRIBUTION TYPE WITH FRESH WHITE, IMPACT RESISTANT WASHABLE DECORATION PANEL. THE SUPPLY AIR IS DISTRIBUTED VIA MOTORIZED LOUVERS WHICH CAN BE HORIZONTALLY AND VERTICALLY ADJUSTED FROM 0° TO 90°.
2. THE INDOOR UNIT'S SOUND PRESSURE SHALL RANGE FROM 25.5 DB(A) TO 33 DB(A) AT LOW SPEED MEASURED AT 5 FEET BELOW THE UNIT.
3. THE 4-WAY SUPPLY AIR FLOW SHALL BE CAPABLE OF FIELD MODIFICATION TO 2-WAY OR 3-WAY AIRFLOW TO ACCOMMODATE VARIOUS INSTALLATION CONFIGURATIONS INCLUDING CORNER INSTALLATIONS.
4. THE DECORATION PANEL SHALL BE A LOW-PROFILE DESIGN, EXTENDING ONLY 5/16" BELOW THE CEILING WITHOUT ANY OVERLAP WITH NEIGHBORING CEILING TILES, ALLOWING FOR INSTALLATION DIRECTLY ADJACENT TO OTHER CEILING COMPONENTS SUCH AS LIGHTS, DIFFUSERS, AND SPRINKLERS, ETC.
5. RETURN AIR SHALL BE THROUGH THE CONCENTRIC PANEL, WHICH INCLUDES A RESIN NET MOLD RESISTANT FILTER. THE INDOOR UNITS SHALL BE EQUIPPED WITH A CONDENSATE PAN AND A FACTORY-MOUNTED CONDENSATE PUMP WITH UP TO 21" OF LIFT, AND HAVE A BUILT-IN SAFETY SHUTOFF AND ALARM.
6. THREE AUTO-SWING POSITIONS SHALL BE AVAILABLE TO CHOOSE FROM, WHICH INCLUDE STANDARD, DRAFT PREVENTION AND CEILING STAIN PREVENTION.
7. THE FAN SHALL HAVE A VARIABLE SPEED DIRECT DRIVE DC MOTOR WITH A STATICALLY AND DYNAMICALLY BALANCED IMPELLER WITH 3 USER-SELECTABLE FAN SPEEDS. THE AUTOMATIC FAN SPEED MODE SHALL ALLOW THE FAN TO VARY BETWEEN 5 SPEEDS BASED ON SPACE LOAD.
8. UNITS SHALL BE SUPPLIED WITH AN OPTIONAL FRESH AIR INTAKE KIT INTRODUCING FRESH AIR BEFORE THE FAN BY WAY OF DIRECT DUCT INSTALLATION TO THE SIDE OF THE INDOOR UNIT CABINET, AND SHALL ALLOW UP TO 3% OF THE UNIT'S NOMINAL AIRFLOW.

TX

2.3 INDOOR UNIT – CONCEALED CEILING DUCTED UNIT
A. PERFORMANCE: AS SPECIFIED ON DRAWINGS.
1. INDOOR UNIT SHALL BE A BUILT-IN CEILING CONCEALED FAN COIL UNIT WITH VARIABLE SPEED DIRECT DRIVE DC TYPE FAN AND AUTO CFM ADJUSTMENT AT COMMISSIONING. CASING SHALL BE CONSTRUCTED OF GALVANIZED STEEL. CONFIGURATION SHALL BE HORIZONTAL DISCHARGE AIR WITH HORIZONTAL RETURN AIR, WITH A MAXIMUM HEIGHT OF 12" AND BE DESIGNED TO FIT IN TIGHT CEILING PLENUMS.
2. THE INDOOR UNIT'S SOUND PRESSURE SHALL RANGE FROM 28 DB(A) TO 36 DB(A) AT LOW SPEED MEASURED 5 FEET BELOW THE DUCTED UNIT.
3. THE INDOOR UNITS SHALL BE EQUIPPED WITH A CONDENSATE PAN AND CONDENSATE PUMP. THE CONDENSATE PUMP SHALL PROVIDE MINIMUM OF 25" OF LIFT FROM THE CENTER OF THE DRAIN OUTLET AND HAVE A BUILT-IN SAFETY SHUTOFF AND ALARM.
4. THE FAN SHALL HAVE A VARIABLE SPEED DIRECT DRIVE DC MOTOR WITH STATICALLY AND DYNAMICALLY BALANCED IMPELLER WITH 3 USER-SELECTABLE FAN SPEEDS. THE AUTOMATIC FAN SPEED MODE SHALL ALLOW THE FAN TO VARY BETWEEN 5 SPEEDS BASED ON SPACE LOAD. THE UNIT SHALL HAVE LOGIC FOR AUTOMATICALLY ADJUSTING EXTERNAL STATIC PRESSURE SETTINGS OF THE FAN MOTOR (SELECTABLE DURING COMMISSIONING).
5. THE UNIT SHALL SHIP FROM THE FACTORY IN A REAR RETURN CONFIGURATION AND SHALL BE FIELD CONVERTIBLE TO A BOTTOM RETURN CONFIGURATION.
6. FIELD INSTALLED MERV8 FILTERS AND FILTER KITS WITH 2" FILTER DEPTHS.

PART 3 - INSTALLATION

3.1 EXAMINATION
A. VERIFY THAT SYSTEM IS LOCATED PER DRAWINGS.
B. VERIFY THAT PROPER POWER SUPPLY IS AVAILABLE.

3.2 INSTALLATION
A. INSTALL UNITS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
B. MOUNT GROUND-MOUNTED AIR-COOLED CONDENSING UNITS 24 IN. (0.61 M) ABOVE GRADE.
C. INSTALL CONDENSING UNITS SO THE FAN BLOWS IN THE SAME DIRECTION AS THE PREVAILING WINDS, UNLESS OTHERWISE DIRECTED BY THE MANUFACTURER.
D. PROVIDE RECESSED WALL MOUNTING BOX FOR MOUNTING THE WIRED INDOOR CONTROLLER. FASTEN THE BOX TO WALL FRAMING STUD, MASONRY, OR OTHER SUITABLE STRUCTURAL SURFACE APPROVED BY THE ARCHITECT; FASTENING TO GYPSUM WALLBOARD IS NOT ACCEPTABLE. PROVIDE INTERCONNECTING LOW-VOLTAGE AND LINE-VOLTAGE WIRING AND CONDUITS, CONCEALED UNLESS OTHERWISE INDICATED. WALL MOUNTING BOX, WIRING, AND CONDUITS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF DIVISION 26 – ELECTRICAL.
E. INSTALL CONDENSING UNITS ON A FLAT SURFACE LEVEL WITHIN 1/8 INCH, AND ELEVATED A MINIMUM OF 18" FROM GROUND OR ROOF SURFACE. PROVIDE INTERMEDIATE SUPPORTS AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.
F. PROVIDE ALL NECESSARY CONTROL WIRING AS RECOMMENDED BY THE MANUFACTURER.
G. HIGH/LOW PRESSURE GAS LINE, LIQUID, AND SUCTION LINES MUST BE INDIVIDUALLY INSULATED BETWEEN THE OUTDOOR AND INDOOR UNITS.
H. PRIOR TO INSTALLATION CONTACT THE LOCAL MANUFACTURER'S REPRESENTATIVE TO REVIEW AND CONFIRM PIPING LAYOUT AND LENGTHS.
I. USE REFRIGERATION BEST PRACTICE TO ALLOW PIPES TO EXPAND AND CONTRACT FREELY. REVIEW MANUFACTURER INSTALLATION INSTRUCTIONS TO ENSURE EXPANSION JOINTS ARE PROPERLY DESIGNED.
J. PRESSURE TEST ALL SYSTEMS TO 550 PSI AFTER SYSTEM WAS VACUUMED AND HELD TO BELOW 500 MICRONS FOR AT LEAST ONE HOUR. REVIEW MANUFACTURER INSTALLATION INSTRUCTIONS FOR PROPER PRESSURE TEST PROCEDURES.

END OF SECTION 238130

SECTION 238200 – CONVECTION HEATING UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. BASEBOARD RADIATION.

1.2 REFERENCES
A. NFPA 70 - NATIONAL ELECTRICAL CODE.

1.3 SUBMITTALS FOR REVIEW
A. PRODUCT DATA: PROVIDE TYPICAL CATALOG OF INFORMATION INCLUDING ARRANGEMENTS.
1. INDICATE MECHANICAL AND ELECTRICAL SERVICE LOCATIONS AND REQUIREMENTS.

1.4 SUBMITTALS AT PROJECT CLOSEOUT
A. WARRANTY: SUBMIT MANUFACTURER WARRANTY AND ENSURE FORMS HAVE BEEN COMPLETED IN OWNER'S NAME AND REGISTERED WITH MANUFACTURER.
B. OPERATION AND MAINTENANCE DATA: INCLUDE MANUFACTURER'S DESCRIPTIVE LITERATURE, OPERATING INSTRUCTIONS, INSTALLATION INSTRUCTIONS, MAINTENANCE AND REPAIR DATA, AND PARTS LISTINGS. SUBMIT UNDER PROVISIONS OF DIVISION 01 SECTION "OPERATION AND MAINTENANCE DATA."

PART 2 - PRODUCTS

2.1 BASEBOARD RADIATION, COMMERCIAL/INSTITUTIONAL GRADE
A. MANUFACTURERS:
1. STERLING HYDRONICS.
2. VULCAN.
3. SLANT-FIN.
4. RITTLING.
B. HEATING ELEMENTS: 3/4 INCH ID SEAMLESS COPPER TUBING, MECHANICALLY EXPANDED INTO EVENLY SPACED ALUMINUM FINS, SUITABLE FOR SOLDERED FITTINGS. GALVANIZED STEEL SLIDE CRADLES.
C. ELEMENT HANGERS: QUIET OPERATING, BALL BEARING CRADLE TYPE PROVIDING UNRESTRICTED LONGITUDINAL MOVEMENT, ON ENCLOSURE BRACKETS.
D. ENCLOSURES: SLOPE-TOP, STAMPED-LOUVERED, PENCIL-PROOF, 16-GAUGE STEEL, WITH EASILY JOINTED COMPONENTS FOR WALL TO WALL INSTALLATION.
E. BACKPLATE: 20-GAUGE STEEL, PAINTED. PARTIAL TYPE, FOR USE WITH BALL-BEARING HANGERS. SUPPORT RIGIDLY ON WALL. MOUNT AT MANUFACTURER'S RECOMMENDED HEIGHT ABOVE FLOOR.
F. FINISH: FACTORY APPLIED BAKED ENAMEL OF COLOR AS SELECTED BY THE ARCHITECT.

PART 3 - EXECUTION

3.1 INSTALLATION
A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
B. INSTALL EQUIPMENT EXPOSED TO FINISHED AREAS AFTER WALLS AND CEILING ARE FINISHED AND PAINTED. AVOID DAMAGE.
C. BASEBOARD RADIATION: LOCATE ON OUTSIDE WALLS AS INDICATED. WHERE DRAWINGS SHOW ELEMENTS LOCATED UNDER WINDOWS, INSTALL WITH ELEMENTS CENTERED UNDER WINDOWS. INSTALL END CAPS WHERE UNITS BUTT AGAINST WALLS.

3.2 CLEANING
A. AFTER CONSTRUCTION IS COMPLETED, INCLUDING PAINTING, CLEAN EXPOSED SURFACES OF UNITS. VACUUM CLEAN COILS AND INSIDE OF CABINETS.
B. TOUCH-UP MARRED OR SCRATCHED SURFACES OF FACTORY-FINISHED CABINETS, USING FINISH MATERIALS FURNISHED BY MANUFACTURER.

END OF SECTION 238200

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TOWN OF SANBORNTON ★ GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTF
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER 10/20/2021

REVISIONS

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SPECIFICATIONS

M5.10

SPECIFICATIONS M5.10

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1/16" = 1'-0" 0' 8' 16' 32'
3/32" = 1'-0" 0' 8' 16' 32' 64'
1/8" = 1'-0" 0' 4' 8' 16' 32' 64'

A B C D E F

1/8" = 1'-0" 0' 4' 8' 16' 32'

3/32" = 1'-0" 0' 8' 16' 32' 64'

1/16" = 1'-0" 0' 8' 16' 32' 64'

ABBREVIATION

SYMBOL	DESCRIPTION
A	ANCHOR(S)
AAV	AUTOMATIC AIR VENT
ABV	ABOVE
ACCOM	ACCOMMODATE
AD	ACCESS DOOR
AE	AIR EXTRACTOR
AFF	ABOVE FINISHED FLOOR
ALT	ALTERNATE
ALUM	ALUMINUM
AP	ACCESS PANEL
APPROX	APPROXIMATE
ARRG	ARRANGEMENT
ATC	AUTOMATIC TEMP CONTROL
AVG	AVERAGE
AWT	AVERAGE WATER TEMP
-	-
BDD	BACK DRAFT DAMPER
BG	BLAST GATE
BHP	BRAKE HORSEPOWER
BLDG	BUILDING
BLW	BELOW
BM	BELL MOUTH
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BSMT	BASEMENT
BTU	BRITISH THERMAL UNIT
-	-
C	COMMON
°C	DEGREES CELSIUS
CAB	CABINET
CAP	CAPACITY
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CI	CAST IRON
CIP	CLEAN IN PLACE
℄	CENTER LINE
CLG	CEILING
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
COL	COLUMN
COMP	COMPRESSOR
CON	CONCENTRIC
CONC	CONCRETE
COND	CONDENSATE
CONN	CONNECTION
CONT	CONTINUATION
CONTR	CONTRACTOR
CP	CONCRETE PIPE
CPVC	CHLORINATED POLYVINYL CHLORIDE
CT	CONDUCTIVITY TRANSMITTER
CU	CUBIC
CVS	CONTROL VALVE STATION
-	-
DA	DIRECT ACTING
DMPR	DAMPER
DB	DRY BULB
DEPT	DEPARTMENT
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGRAM
DIE	DROP IN ENCLOSURE
DIFF	DIFFERENTIAL
DISCH	DISCHARGE
DIV	DIVISION
DIW	DOWN IN WALL
DL	DOOR LOUVER
DN	DOWN
DPDT	DOUBLE PULL DOUBLE THROW
DT	DRIP AND TRAP
DWG	DRAWING
DX	DIRECT EXPANSION
-	-
EX	EXISTING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
ECC	ECCENTRIC
ECG	EGGCRATE GRILLE
EDR	EQUIVALENT DIRECT RADIATION
EEC	ENCLOSURE END CAP
EER	ENERGY EFFICIENCY RATING
EFF	EFFICIENCY
EG	FOR EXAMPLE
EL	ELEVATION
ELEC	ELECTRIC
ELEV	ELEVATOR
ENT	ENTERING
EQ	EQUAL
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
ESP	EXTERNAL STATIC PRESSURE
ETC	AND SO FORTH
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXPAN	EXPANSION
EXT	EXTERNAL
-	-
°F	DEGREES FAHRENHEIT
FA	FROM ABOVE
FB	FROM BELOW
FCV	FLOW CONTROL VALVE
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FG	FILTER GRILLE
FIH	FINNED HEIGHT
FIN	FINISHED
FLG	FLANGE
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE
FLR	FLOOR
FO	FLAT OVAL
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FR	FILTER REGISTER
FRICT	FRICTION
FS	FUME SCRUBBER
FT	FEET
FTB	FLOOR TO BOTTOM
FTC	FLOOR TO CENTERLINE
FV	FACE VELOCITY
FXC	FLEXIBLE CONNECTION

SYMBOL	DESCRIPTION
G	GUIDE(S)
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GH	GROUND HYDRANT
GN	GENERAL NOTE
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRS/LB	GRAINS PER POUND
-	-
H	HEIGHT
H20	WATER
HB	HOSE BIBB
HC	HEATING CONTRACTOR
HD	HAND DAMPER
HD	HEAD (SEE SCHEDULES)
HP	HORSEPOWER
HR	HOUR
HTR	HEATER
HZ	HERTZ
-	-
ID	INTERNAL DIAMETER
I/L	INTERLOCK
IN	INCHES
INCL	INCLUDING
INIT	INITIAL
INT	INTERNAL
INV	INVERT
-	-
KW	KILOWATT
-	-
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LB	POUND
LBS/HR	POUNDS PER HOUR
LD	LINEAR DIFFUSER
LH	LATENT HEAT
LIN	LINEAR
LIQ	LIQUID
LR	LEVEL RECEIVER
LRA	LOCKED ROTOR AMPS
LS	LAB SINK
LVG	LEAVING
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
-	-
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MC	MECHANICAL CONTRACTOR
MBH	THOUSANDS OF BTU PER HOUR
MED	MEDIUM
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MTD	MOUNTED
-	-
NC	NORMALLY CLOSED
NEG	NEGATIVE
NIC	NOT IN CONTRACT
No	NUMBER
NO	NORMALLY OPEN
NOM	NOMINAL
NTS	NOT TO SCALE
-	-
OA	OUTDOOR AIR
OB	OFF BOTTOM
OD	OUTSIDE DIMENSION
OC	ON CENTER
OCC	OCCUPIED
OFE	OWNER FURNISHED EQUIPMENT
OPE	OWNER PREPURCHASED EQUIP
OPG	OPENING
OS	OPEN SITE
OT	OFF TOP
OZ	OUNCE
OV	OUTLET VELOCITY
-	-
PART	PARTIAL
PD	PRESSURE DROP
PERF	PERFORATED
PH	PHASE
PI	PRESSURE INDICATOR
PL	PLATE
PNEU	PNEUMATIC
POS	POSITIVE
PRESS	PRESSURE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	PRESSURE TRANSMITTER
PVC	POLYVINYL CHLORIDE
PVDF	POLYVINYLIDENE FLUORIDE
PVS	POLYVINYL COATED STEEL
PP	POLYPROPYLENE
-	-
QTY	QUANTITY
-	-
RA	RETURN AIR
RAC	RUN ABOVE CEILING
RACBJ	RUN ABOVE CEILING BETWEEN JOISTS
RAD	RADIATION
RAF	RUN ABOVE FLOOR
RATC	RUN AT CEILING
RBC	RUN BELOW CEILING
RBF	RUN BELOW FLOOR
RBG	RUN BELOW GRADE
RBJ	RUN BETWEEN JOIST
RCP	REINFORCED CONCRETE PIPE
RE	ROUNDED ENTRANCE/EXIT
REL	RELIEF
REQ	REQUIRED
RET	RETURN
RH	RELATIVE HUMIDITY
RIC	RUN IN CHASE
RICW	RUN IN CASEWORK
RIE	RUN IN ENCLOSURE
RIEAE	RUN IN ENCLOSURE ABOVE ELEMENT
RIW	RISE IN WALL
RLA	RATED LOAD AMPS
RM	ROOM
ROH	RUN OVERHEAD
RPM	REVOLUTIONS PER MINUTE
RTJ	RUN THRU JOIST WEBBING
RX	REMOVE EXISTING

SYMBOL	DESCRIPTION
OZ	OUNCE
OV	OUTLET VELOCITY
-	-
PART	PARTIAL
PD	PRESSURE DROP
PERF	PERFORATED
PH	PHASE
PI	PRESSURE INDICATOR
PL	PLATE
PNEU	PNEUMATIC
POS	POSITIVE
PRESS	PRESSURE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	PRESSURE TRANSMITTER
PVC	POLYVINYL CHLORIDE
PVDF	POLYVINYLIDENE FLUORIDE
PVS	POLYVINYL COATED STEEL
PP	POLYPROPYLENE
-	-
QTY	QUANTITY
-	-
RA	RETURN AIR
RAC	RUN ABOVE CEILING
RACBJ	RUN ABOVE CEILING BETWEEN JOISTS
RAD	RADIATION
RAF	RUN ABOVE FLOOR
RATC	RUN AT CEILING
RBC	RUN BELOW CEILING
RBF	RUN BELOW FLOOR
RBG	RUN BELOW GRADE
RBJ	RUN BETWEEN JOIST
RCP	REINFORCED CONCRETE PIPE
RE	ROUNDED ENTRANCE/EXIT
REL	RELIEF
REQ	REQUIRED
RET	RETURN
RH	RELATIVE HUMIDITY
RIC	RUN IN CHASE
RICW	RUN IN CASEWORK
RIE	RUN IN ENCLOSURE
RIEAE	RUN IN ENCLOSURE ABOVE ELEMENT
RIW	RISE IN WALL
RLA	RATED LOAD AMPS
RM	ROOM
ROH	RUN OVERHEAD
RPM	REVOLUTIONS PER MINUTE
RTJ	RUN THRU JOIST WEBBING
RX	REMOVE EXISTING
-	-
SA	SUPPLY AIR
SCH	SCHEDULE
SCHEM	SCHEMATIC
SH	SENSIBLE HEAT
SIP	STERILIZE IN PLACE
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SPST	SINGLE POLE SINGLE THROW
SQ	SQUARE
SST	SUPPORT STEEL
STD	STANDARD
STL	STEEL
ST.ST.	STAINLESS STEEL
STM	STEAM
STR	STRUCTURAL
SUCT	SUCTION
SUP	SUPPLY
SYS	SYSTEM
-	-
TAD	TRANSFER AIR DUCT
TB	THRUST BLOCK
TDH	TOTAL DYNAMIC HEAD
TE	TEMPERATURE ELEMENT
TEMP	TEMPERATURE
TH	TOTAL HEAT
TI	TEMPERATURE INDICATOR
TP	TOTAL PRESSURE
TSP	TOTAL STATIC PRESSURE
TT	TEMPERATURE TRANSMITTER
TYP	TYPICAL
-	-
UNOCC	UNOCCUPIED
UP	UP
-	-
V	VOLTS
V	VENT
VA	VALVE
VEL	VELOCITY
VI	VIBRATION ISOLATOR
VOLT	VOLTAGE
VTR	VENT THRU ROOF
-	-
W	WIDTH
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER COLUMN
WG	WATER GAUGE
WH	WALL HYDRANT

KEY TO SYMBOLS

SYMBOL	DESCRIPTION
	GATE VALVE
	BALL VALVE
	GAS COCK
	SWING CHECK VALVE
	LIFT CHECK VALVE
	BALANCING VALVE
	BUTTERFLY VALVE
	BUTTERFLY VALVE
	GLOBE VALVE
	PLUG VALVE
	LOCKABLE VALVE
	DIAPHRAGM VALVE
	TRIPLE DUTY VALVE
	BACKFLOW PREVENTER
	VACUUM BREAKER
S	SOLENOID VALVE
	CONTROL VALVE - AUTOMATIC
	PRESSURE REDUCING VALVE
	BACKPRESSURE REGULATOR
	STRAINER
	STRAINER WITH DRAIN VALVE AND CAP/PLUG
	ANGLE VALVE
TP	RELIEF VALVE - TEMPERATURE AND PRESSURE
	SAFETY RELIEF VALVE
	3 WAY CONTROL VALVE - AUTOMATIC
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	PIPE UNION
	PIPE FLANGE
	SANITARY CLAMP
	PIPE CAP
	TEMPERATURE SENSOR WELL
PI	PRESSURE GAUGE WITH GAUGE COCK AND SNUBBER (WATER)
PI	PRESSURE GAUGE WITH GAUGE COCK AND SYPHON (STEAM)
PI	PRESSURE GAUGE
TI	THERMOMETER - DIAL TYPE
	THERMOMETER
FS	FLOW SWITCH
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
TT	TEMPERATURE TRANSMITTER
PI	SANITARY PRESSURE GAUGE
TI	SANITARY THERMOMETER DIAL TYPE
PT	SANITARY PRESSURE TRANSMITTER
TT	SANITARY TEMPERATURE TRANSMITTER

SYMBOL	DESCRIPTION
T	TRAP
T	THERMODYNAMIC TRAP
T	FLOAT AND THERMOSTATIC TRAP
T	BUCKET TRAP
	ELECTRICALLY TRACED PIPE
	AIR PURGER
S	BASKET STRAINER
	WATER HAMMER ARRESTOR
RTD	THERMOCOUPLE
F	FILTER
F	FILTER
	INLINE PUMP
	FLEXIBLE CONNECTION
	FLOW METER
FD	FLOOR DRAIN
WCO	WALL CLEANOUT
CO	FLOOR CLEANOUT
GH	OUTSIDE GROUND HYDRANT
WH	OUTSIDE WALL HYDRANT
OS	OPEN SITE DRAIN
PDR	PLENUM DRAIN WITH DEEP SEAL TRAP
RD	ROOF DRAIN
MH	MANHOLE
	FLOOR DRAIN
MAV	AIR VENT-MANUAL
AAV	AIR VENT-AUTOMATIC
	QUICK CONNECT FITTING
	HOSE BARB
	HOSE BIBB
	EXPANSION LOOP
A	PIPE ANCHOR
G	PIPE GUIDE
	PIPE DROPPING DOWN
	PIPE RISING UP
	PIPE 45° OFFSET DOWN
	PIPE BRANCH TOP CONNECTION
	PIPE BRANCH BOTTOM CONNECTION
	PIPE BRANCH SIDE CONNECTION
	DIRECTION OF FLOW
	DIRECTION OF SLOPE
	PIPE DROPPING DOWN WITH GATE VALVE IN DROP
	PIPE BRANCH - BOTTOM CONNECTION WITH GATE VALVE IN DROP
	PIPE DROPPING DOWN WITH BALL VALVE IN DROP
	PIPE BRANCH - BOTTOM CONNECTION WITH BALL VALVE IN DROP

SYMBOL	DESCRIPTION
Ar	ARGON
AV	ACID VENT
AW	ACID WASTE
-	
BA	BREATHING AIR
BD	BOILER BLOWDOWN
BWR	BRINE WATER RETURN
BWS	BRINE WATER SUPPLY
-	
CA	COMPRESSED AIR
CDA	CLEAN DRY AIR
CF	CHEMICAL FEED (HVAC)
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CIP	CLEAN IN PLACE
CIPR	CLEAN IN PLACE RETURN
CIPS	CLEAN IN PLACE SUPPLY
CO2	CARBON DIOXIDE
CS	CLEAN STEAM
CSC	CLEAN STEAM CONDENSATE
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
-	
D	DRAIN
DI	DI WATER
DUST	DUST COLLECTION
DCW	DOMESTIC COLD WATER (CW)
DHW	DOMESTIC HOT WATER (HW)
DHWR	DOMESTIC HOT WATER RECIRC (HWRC)
DHW 180	DOMESTIC HOT WATER (180°F)
DHWR 180	DOMESTIC HOT WATER RECIRC (180°F)
-	
EXH	EXHAUST
-	
F	FIRE PROTECTION
FOG	FUEL OIL GAUGE
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FW	BOILER FEEDWATER
-	
G	NATURAL GAS
GLYR	GLYCOL RETURN
GLYS	GLYCOL SUPPLY
-	
H2	HYDROGEN
HE	HELIUM
HPA	HIGH PRESSURE AIR
HPC	HIGH PRESSURE CONDENSATE
HPS	HIGH PRESSURE STEAM
HTWR	HIGH TEMPERATURE WATER RETURN
HTWS	HIGH TEMPERATURE WATER SUPPLY
HVC	HOUSEKEEPING VACUUM
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
-	
IA	INSTRUMENT AIR
LN2	LIQUID NITROGEN
LP	LIQUID PETROLEUM GAS
LPC	LOW PRESSURE CONDENSATE
LPL	GREASE LINE
LPS	LOW PRESSURE STEAM
LV	LAB VENT
LW	LAB WASTE
-	
MPC	MEDIUM PRESSURE CONDENSATE
MPS	MEDIUM PRESSURE STEAM
-	
N2	NITROGEN
NPW	NON-POTABLE WATER
-	
O2	OXYGEN
OF	OVERFLOW
-	
PA	PLANT AIR
PAW	PUMPED ACID WASTE
PC	PUMPED CONDENSATE
PCHWR	PROCESS CHILLED WATER RETURN
PCHWS	PROCESS CHILLED WATER SUPPLY
PCWR	PROCESS COOLING WATER RETURN
PCWS	PROCESS COOLING WATER SUPPLY
PLW	PUMPED LAB WASTE
PPW	PUMPED PROCESS WASTE
PSAN	PUMPED SANITARY SEWER
PV	PROCESS VENT
PVAC	PROCESS VACUUM
PW	PROCESS WASTE
-	
RL	REFRIGERANT LIQUID
ROW	REVERSE OSMOSIS WATER
RS	REFRIGERANT SUCTION
RWC	RAINWATER CONDUCTOR
RW	RECLAIM WASTE
-	
SAN	SANITARY SEWER
SAN(SS)	STAINLESS STEEL SANITARY SEWER
SD	STORM DRAIN
SFS	SOLUTION SUPPLY
SFR	SOLUTION RETURN
SIP	STEAM IN PLACE
SOLW	SOLVENT WASTE
SOW	SOFT WATER
SXS	CONNECTED TO SOFT WATER
SXR	(ABANDONED PIPE)
-	
TP	TRAP PRIMING
TW	TEMPERED WATER
TWR	TOWER WATER RETURN
TWS	TOWER WATER SUPPLY
USP	USP PURIFIED WATER
V	VENT PIPING
VAC	VACUUM
VE	VACUUM EXHAUST
WFI	WATER FOR INJECTION
	NEW PIPING (SERVICE AS INDICATED)
	EXISTING PIPING TO BE REMOVED (SERVICE AS INDICATED)
	EXISTING PIPING TO REMAIN (SERVICE AS INDICATED)

GENERAL NOTES

1. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR ALL EQUIPMENT AND MATERIALS LISTED IN PLUMBING MATERIALS LIST.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT, MATERIALS, AND LABOR TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM AS INDICATED ON THE DESIGN DOCUMENTS.
3. CONTRACTOR SHALL OBTAIN ALL PERMITS, INSPECTIONS, AND APPROVALS PRIOR TO AND DURING CONSTRUCTION.
4. ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF ONE (1) YEAR FROM DATE OF ACCEPTANCE BY OWNER.
5. ALL MATERIALS AND INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE 2018 NORTH CAROLINA STATE PLUMBING CODE, STATE CODE, LOCAL CODES, AND ALL AUTHORITIES HAVING JURISDICTION.
6. CONTRACTOR SHALL PROVIDE ALL ROOF OPENINGS, FLASHING, AUXILIARY STEEL, THREADED RODS, ETC., TO SUPPORT HIS EQUIPMENT ON OR FROM THE STRUCTURE.
7. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES AND IN FIELD PRIOR TO INSTALLATION OF ANY WORK. REPORT ALL CONFLICTS IMMEDIATELY TO ARCHITECT AND ENGINEER.
8. CONTRACTOR SHALL COORDINATE EXACT LOCATION OF ALL EQUIPMENT WITH ARCHITECT AND OTHER TRADES.
9. THE CONTRACTOR SHALL PRESSURE TEST ALL PIPING IN ACCORDANCE WITH CODES AND AUTHORITIES HAVING JURISDICTION.
10. PLUMBING CONTRACTOR SHALL INCLUDE ALL COSTS, PERMITS AND FEES ASSOCIATED WITH PLUMBING AND SANITARY PIPING WORK FOR THIS PROJECT.
11. THE CONTRACTOR SHALL SEAL ALL PENETRATIONS THROUGH FIRE RATED STRUCTURES WITH FIREPROOF SEALANT AS MANUFACTURED BY 3M OR APPROVED EQUAL.
12. CONTRACTOR IS RESPONSIBLE FOR ALL ROOF PENETRATIONS. CONTRACTOR SHALL USE HAMLIN ROOFING TO MAINTAIN ROOF WARRANTY.

(1) SHEET NOTE NUMBER
CONNECT NEW TO EXISTING
TERMINATION POINT OF DEMOLITION
PREPURCHASED EQUIPMENT
CONNECT TO MANUFACTURER'S PRE-PIPED CONNECTION
(1) INDICATES REVISION & NUMBER

XX — INDICATES SECTION NUMBER
XX — INDICATES ON WHICH DRAWING SECTION APPEARS

X — EQUIPMENT DESIGNATION (REFER TO EQUIPMENT SCHEDULES)
X-X — EQUIPMENT NUMBER
SYSTEM NUMBER

X — INDICATES RISER NUMBER
X — INDICATES PIPE SIZE

F
RATING
NUMBER INDICATES THE HOURLY FIRE RESISTANCE RATING. IF NONE IS SHOWN, THE RATING IS 1 1/2 HOURS.
TYPE
(D) INDICATES "DYNAMIC TYPE"
(-) INDICATES "STATIC TYPE"
FUNCTION
(M) INDICATES "MONITORED"
(-) INDICATES "NOT-MONITORED"
FIRE DAMPER WITH ACCESS DOOR

DRAWING LIST - PLUMBING

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TOWN OF SANBORNTON ★ GRANTED 1748 INCORPORATED 1770 ★

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
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DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE - THOMAS W. BETTERIDGE No. 13988 LICENSED - PROFESSIONAL ENGINEER
[illegible] 10/20/2021

REVISIONS

SHEET TITLE:
GENERAL NOTES

P0.1

GENERAL NOTES P0.1

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BACKFLOW PREVENTER SCHEDULE

TAG	SERVES	SYSTEM CONNECTION (IN.)	FLOW (GPM)	PRESSURE DROP (PSI)	VELOCITY (FEET PER SECOND)	MANUFACTURER	MODEL	NOTES
BFP-1	BOILER	3/4	14	15	7.5	WATTS	LF909M1QT-S	1, 2
NOTES:								
1. WITH BALL VALVES, STRAINER WHERE INDICATED, AIR GAP FITTING, AND DRAIN ELBOW								
2. PIPE ATMOSPHERIC VENT TO FLOOR DRAIN WITH AIR GAP								

EXPANSION TANK SCHEDULE

TAG	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	SYSTEM CONNECTION (IN.)	RATED PRESSURE (PSIG)	RATED TEMPERATURE (DEG. F)	MANUFACTURER	MODEL	NOTES
EX-1	4.4	3.2	3/4	150	200	AMTROL	ST-12	1
EX-2	44	33	1-1/4	150	200	AMTROL	WX-250	2
NOTES:								
1. BLADDER TYPE, WITH STAINLESS STEEL SYSTEM CONNECTION. SERVES DOMESTIC HOT WATER								
2. BLADDER TYPE, WITH STAINLESS STEEL SYSTEM CONNECTION. SERVES DOMESTIC WELL PUMP								

DOMESTIC HOT WATER CIRCULATOR PUMP SCHEDULE

TAG	SERVES	TYPE	CAPACITY (GPM)	HEAD (FT WG)	FLANGE (IN.)	MOTOR		UNIT ELECTRICAL					MANUFACTURER	MODEL	NOTES
						H.P.	RPM	VOLTS	PH	HZ	FLA (AMPS)	MOPD (AMPS)			
HWC-1	EWH-1	CIRCULATOR	8	12	3/4	1/8	3250	115	1	60	1.4	15	TACO	009-SF5	1
NOTES:															
1. STAINLESS STEEL CONSTRUCTION, INCLUDING BODY AND COMPANION FLANGES															

ELECTRIC HYBRID DOMESTIC WATER HEATER

TAG	STORAGE (GAL)	FIRST HOUR RATING (GPH)	RECOVERY RATING @ 90 DEG. F RISE (GPH)	DIMENSIONS (IN)		ELECTRIC							MANUFACTURER	MODEL	NOTES
				WIDTH (DIA.)	HEIGHT	WATTS	COMPRESSOR BTU/H	VOLTS	PHASE	HERTZ	MAX AMPERAGE	BREAKER			
EWH-1	40	60	26	21	63	4500	4200	230	1	60	21	30 AMP	RHEEM	PROPH40 T2 RH375-SO	1, 2
NOTES:															
1. PROTERRA WITH LEAKGUARD, 4,500 WATT ELEMENT AND UEF OF 3.75. 2. PROVIDE HOLDRITE #40-S-24 16" HIGH STAND															

PLUMBING FIXTURE SCHEDULE

TAG	TYPE	BRANCH SIZES (IN.)				MANUFACTURER	MODEL	COLOR	MOUNTING HEIGHT	REMARKS	FAUCETS AND VALVES	ACCESSORIES	MOUNTING HARDWARE	NOTES
		CW	HW	W	V									
P1	WATER CLOSET - ADA FLOOR MOUNTED - TANK TYPE	1/2	-	4	2	AMERICAN STANDARD	204AA.104	WHITE	-	EDGEMATE RIGHT HEIGHT ELONGATED 12" ROUGH-IN TOILET	1/2" SUPPLY WITH STOP	AMERICAN STANDARD 5257A SOLID PLASTIC CLOSED FRONT ELONGATED SEAT WITH COVER	-	-
P2	LAVATORY - ADA	1/2	1/2	1-1/2	1-1/2	ZURN	Z5341	WHITE	34" AFF	WALL-HUNG LAVATORY WITH SINGLE FAUCET HOLE AND HOLES FOR CONCEALED ARM CARRIER SYSTEM	SLOAN SENSOR FAUCET EAF-250 0.5 GPM BATTERY OPERATED PROVIDE WITH ASSE 1070 LISTED MIXING VALVE WATTS LFUSG-B McGUIRE LF170 LK 1/2" SUPPLY WITH STOP	STRAINER: McGUIRE MANUFACTURING 155AECO TRAP: DEARBORN BRASS 510-1 TRUEBRO LAVGUARD 2 OR LAV SHIELD PIPING COVERS PER ADA REQUIREMENTS	ZURN Z1231 CONCEALED ARM CARRIER SYSTEM	-
P3	MOP BASIN 24x24	3/4	3/4	3	2	FIAT	MSB 2424	-	-	"MOLDED STONE" 24" x 24" MOP SERVICE BASIN WITH STAINLESS STEEL DOME STRAINER, STAINLESS STEEL DRAIN BODY AND QDC-3 SERIES NEOPRENE GASKET	830 AA WALL MOUNTED SERVICE FAUCET; CHROME PLATED WITH VACUUM BREAKER, INTEGRAL STOPS, ADJUSTABLE WALL BRACE, PAIL HOOK AND 3/4" HOSE THREAD ON SPOUT, PROVIDE WITH ASSE 1070 LISTED MIXING VALVE WATTS LFUSG-B.		889-CC MOP BRACKET, E-77-AA VINYL BUMPER GUARD, STAINLESS STEEL WALL GUARDS, 832-AA HOSE AND BRACKET	STAINLESS STEEL DRAIN BODY WITH COMBINATION DOME STRAINER AND LINT BASKET IS DESIGNED TO PROVIDE FOR A CAULK CONNECTION OR QDC-3 JOINT TO A 3" DRAIN PIPE
P4	WATER COOLER - BF	1/2	-	1-1/2	1-1/2	ELKAY	LZSTL8WSLK	LIGHT GRAY GRANITE	-	"EZH2O" BOTTLE FILLING STATION & VERSATILE BI-LEVEL ADA COOLER, 8.0 GPH WITH BOTTLE FILLING STATION ON LOW SIDE, LOW AND HIGH SIDE LOCATION PER ARCHITECTURAL	-		WATTS CA-431-1 FLOOR-MOUNTED CARRIER	PROVIDE DEDICATED 20 AMP GFCI ELECTRICAL POWER: 115V/1/60, 6 AMPS, 370 WATTS
P5	WALL HYDRANT - FREEZE PROOF	3/4	-	-	-	WATTS	HY-725-88	-	SEE ARCHITECTURAL	CONCEALED NON-FREEZE KEY OPERATED WALL HYDRANT WITH NICKEL BRONZE BOX AND DOOR, CHROME PLATED HYDRANT FACE, INTEGRAL VACUUM BREAKER AND WALL CLAMP	ISOLATION BALL VALVE IN INDIVIDUAL FEED LINE		FURNISH TO THE OWNER TWO HYDRANT PARTS REPAIR KITS AND ONE CARTRIDGE REMOVAL WRENCH FOR EACH LENGTH RANGE OF HYDRANT	SELECT LENGTH FOR WALL ASSEMBLY THICKNESS
P6	SINGLE BOWL DROP - IN	1/2	1/2	1-1/2	1-1/2	ELKAY	LRAD252260	-	-	STAINLESS STEEL SINGLE BOWL SELF RIMMING SINK, 25"W x 22"L OVERALL, 21"W x15-3/4"L x 6"D BOWL; STAINLESS STEEL DROP-IN	ELKAY LKD2439C FAUCET PROVIDE WITH ASSE 1070 LISTED MIXING VALVE AND ELKAY LK35 STRAINER	-		-
FD	FLOOR DRAIN - STANDARD, ROUND	-	-	3	2	WATTS	FD-100-A-3-NH-A7-7	-	-	EPOXY COATED CAST IRON FLOOR DRAIN WITH ANCHOR FLANGE, REVERSIBLE CLAMPING COLLAR WITH PRIMARY & SECONDARY WEEPHOLES, 7-IN. DIA. MEDIUM-DUTY ADJUSTABLE ROUND NICKEL BRONZE STRAINER, AND NO-HUB (STANDARD) OUTLET WITH TRAP PRIMER CONNECTION	-		"SURE-SEAL" TRAP SEAL IN BODY	-
FCO	FLOOR CLEANOUT	-	-	-	-	WATTS	CO-200-RX	-	-	EPOXY COATED CAST IRON FLOOR CLEANOUT WITH 5" DIA. ROUND ADJUSTABLE GASKETED HEAVY-DUTY NICKEL BRONZE TOP, REMOVABLE GAS-TIGHT GASKETED BRASS CLEANOUT PLUG	-		-	SIZE PER PLUMBING PLANS
WCO	WALL CLEANOUT	-	-	-	-	WATTS	CO-590-RD	-	-	WALL CLEANOUT WITH COUNTERSUNK THREADED BRASS PLUG, STAINLESS STEEL ACCESS COVER, VANDAL-PROOF STAINLESS STEEL SCREW	-		-	SIZE PER PLUMBING PLANS

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KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	
DESN. BY:	MJR
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE - THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER 10/20/2021

REVISIONS

SHEET TITLE:

SCHEDULES

P0.2

SCHEDULES P0.2

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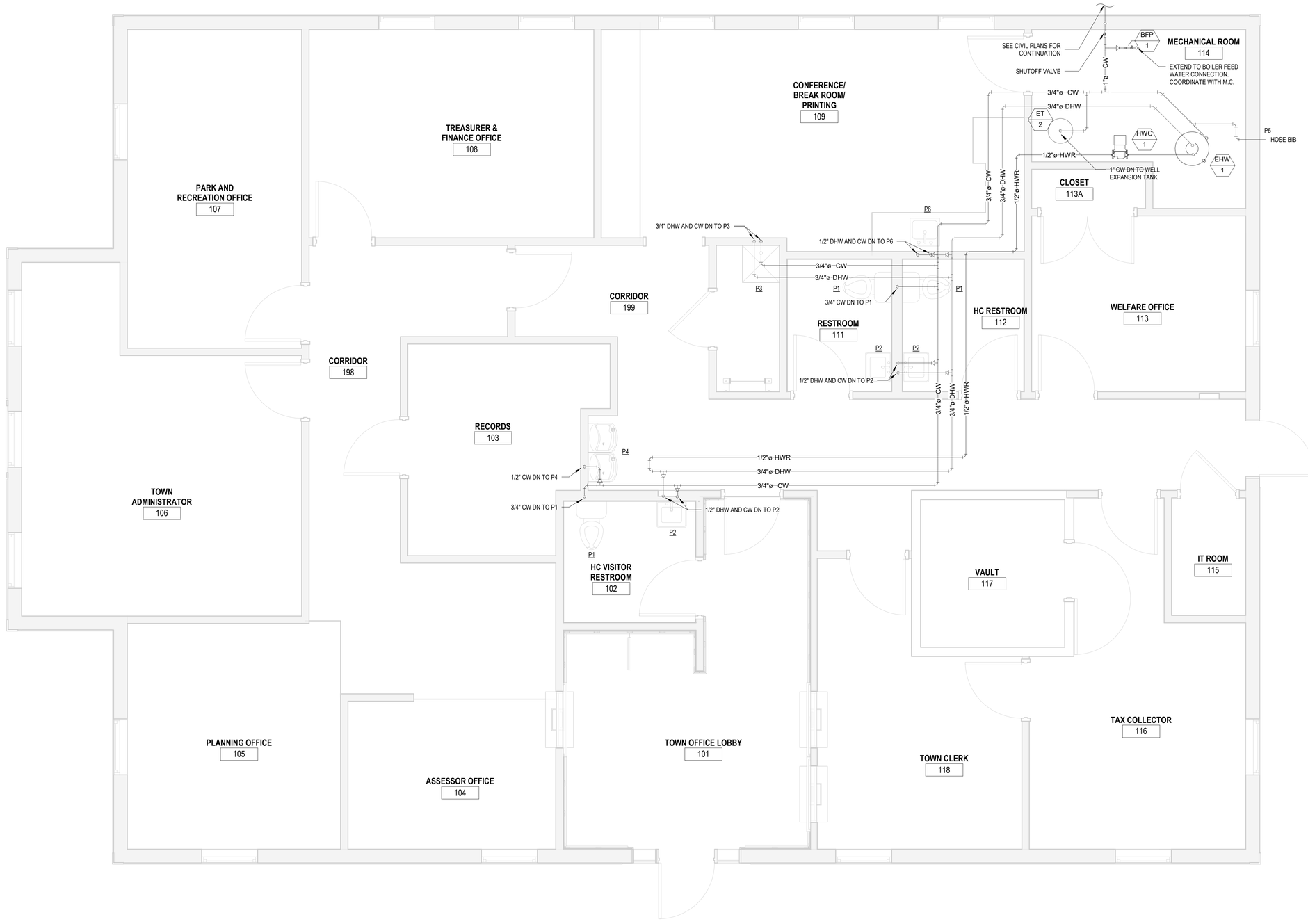
1/8" = 1'-0" 32' 16' 8' 4' 0' 4
3/32" = 1'-0" 64' 32' 16' 8' 0' 3
1/16" = 1'-0" 64' 32' 16' 8' 0' 2 1
A B C D E F



1 P1.1 FIRST FLOOR - DOMESTIC HOT AND COLD
Scale: 3/8" = 1'-0"

1/8" = 1'-0" 3/32" = 1'-0" 1/16" = 1'-0"

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

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SHEET TITLE:
FIRST FLOOR - DOMESTIC HOT AND COLD

P1.1

FIRST FLOOR - DOMESTIC HOT AND COLD P1.1

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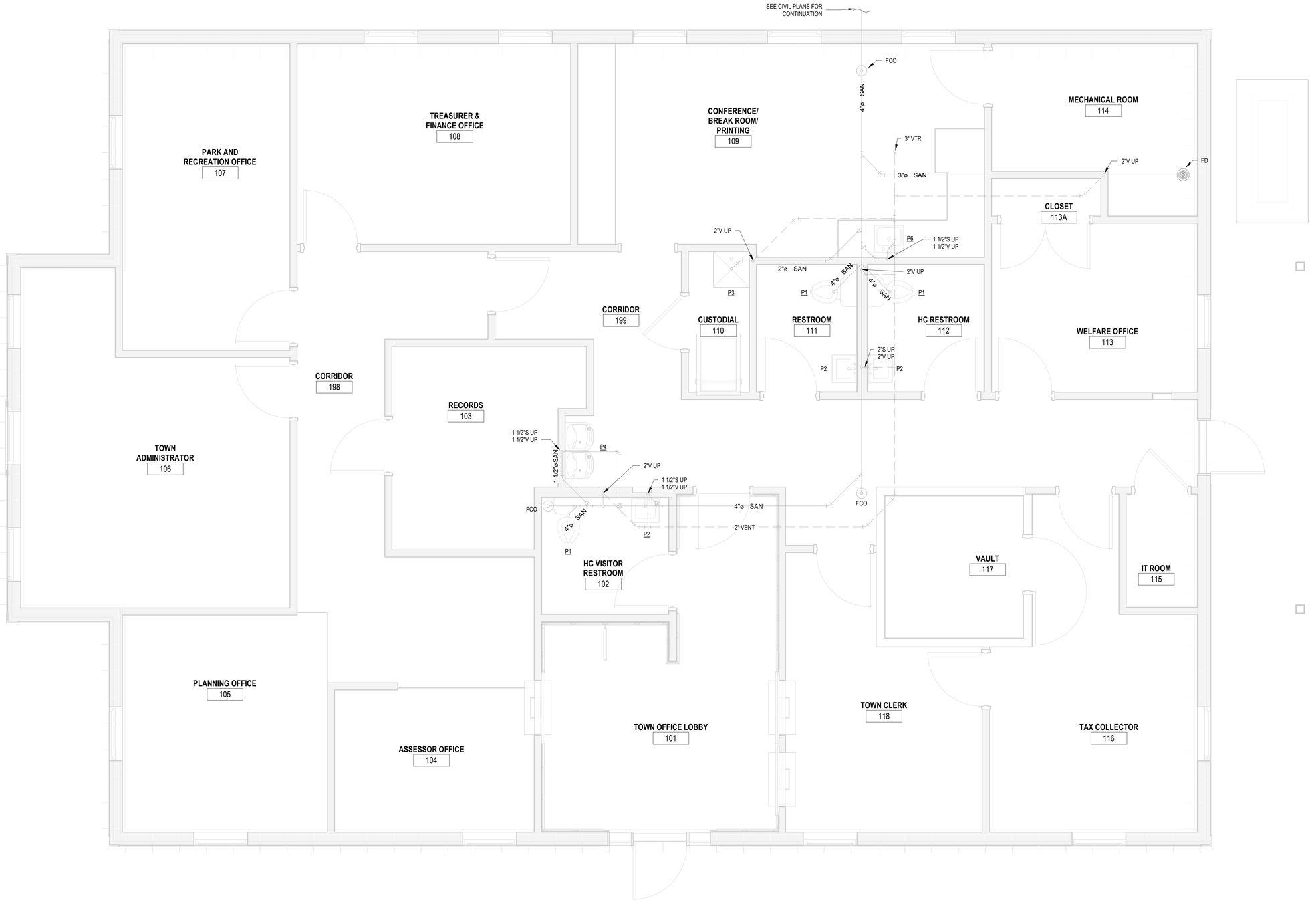

1 P1.2 FIRST FLOOR - SANITARY AND VENT
Scale: 3/8" = 1'-0"

1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

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REVISIONS

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FIRST FLOOR - SANITARY AND VENT

P1.2

P1.2 FIRST FLOOR - SANITARY AND VENT

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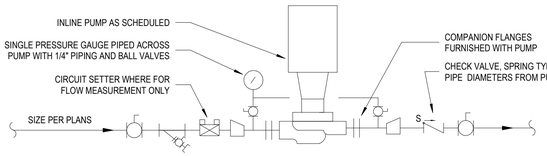
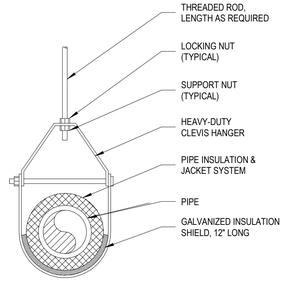
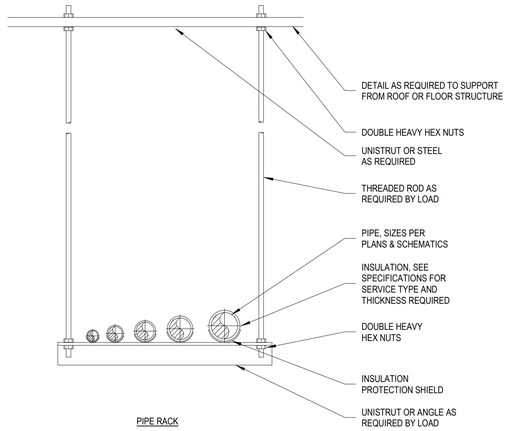


NOTES:
1. REDUCERS SHALL BE ECCENTRIC TYPE.
2. VALVES SHALL BE SAME SIZE AS PIPE.
3. GAUGE SHALL BE 0-120 PSIG.
4. PUMP SHALL BE 7 FT OR LESS AFF.

6 P3.1 INLINE PUMP
Scale:N.T.S.

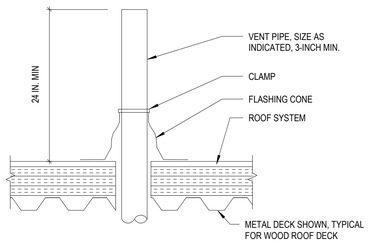


CLEVIS HANGER 3" AND SMALLER



PIPE RACK

5 P3.1 TYPICAL PIPE SUPPORT DETAILS
Scale:N.T.S.



4 P3.1 PLUMBING ROOF VENT
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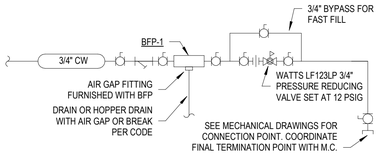

3 P3.1 BOILER WATER MAKEUP
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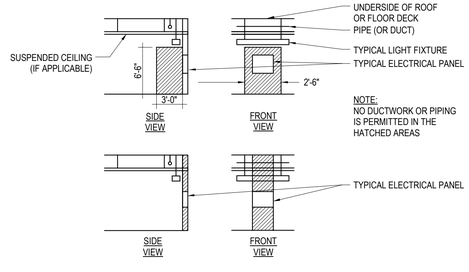
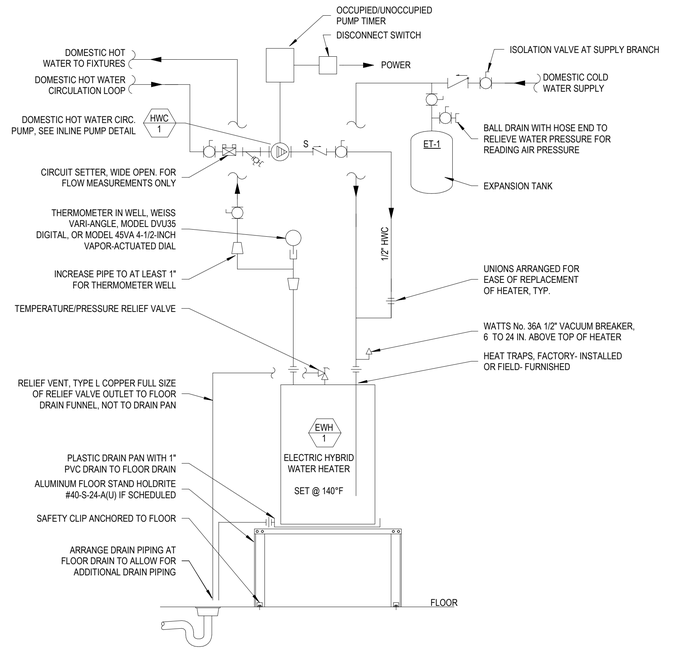


2 P3.1 MIN. CLEARANCES AT ELECTRICAL PANELS_
Scale:N.T.S.



1 P3.1 DOMESTIC WATER HEATER
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DETAILS

P3.1

DETAILS P3.1

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1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PROVIDE LABOR, MATERIALS, ACCESSORIES, AND OTHER RELATED ITEMS AS REQUIRED TO COMPLETE OPERATIONS IN CONNECTION WITH THE COMPLETE INSTALLATION OF THE PLUMBING SYSTEMS AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN.

1.2 RELATED REQUIREMENTS

A. CONDITIONS OF THE CONTRACT APPLY TO THE WORK, INCLUDING THE WORK OF THIS DIVISION. EXAMINE CONTRACT DOCUMENTS FOR REQUIREMENTS AFFECTING THE WORK.

B. PROVIDE COOPERATION WITH, AND ASSISTANCE TO, THE TESTING AND BALANCING (TAB) AGENT SPECIFIED IN DIVISION 23 SECTION "TESTING, ADJUSTING, AND BALANCING FOR MECHANICAL SYSTEMS."

1.3 DRAWINGS

A. THE GENERAL LOCATION OF THE APPARATUS AND THE DETAILS OF THE WORK ARE INDICATED ON THE DRAWINGS. EXACT LOCATIONS NOT INDICATED SHALL BE DETERMINED AT THE SITE AS THE WORK PROGRESSES AND SHALL BE SUBJECT TO THE ARCHITECT'S APPROVAL.

B. IT IS NOT INTENDED THAT THE DRAWINGS SHALL SHOW EVERY PIPE, PIPE RISE, PIPE DROP, PIPE FITTING, OR APPLIANCE, BUT IT SHALL BE A REQUIREMENT TO FURNISH, WITHOUT ADDITIONAL EXPENSE, MATERIAL AND LABOR NECESSARY TO COMPLETE THE SYSTEMS IN ACCORDANCE WITH THE DESIGN INTENT AND WITH THE HIGHEST POSSIBLE QUALITY AVAILABLE.

1.4 REQUIREMENTS

A. INSTALLATION INSTRUCTIONS: OBTAIN MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS TO AID IN PROPERLY EXECUTING WORK ON MAJOR PIECES OF EQUIPMENT. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

B. OBJECTIONABLE NOISE, FUMES AND VIBRATION:
1. PLUMBING AND ELECTRICAL EQUIPMENT SHALL OPERATE WITHOUT CREATING OBJECTIONABLE NOISE, FUMES, OR VIBRATION, AS DETERMINED BY THE ARCHITECT.
2. IF SUCH OBJECTIONABLE NOISE, FUMES, OR VIBRATION IS PRODUCED AND TRANSMITTED TO OCCUPIED PORTIONS OF BUILDING BY APPARATUS, PIPING, OR ANY OTHER PART OF MECHANICAL AND ELECTRICAL WORK, MAKE NECESSARY CHANGES AND ADDITIONS, AS APPROVED, WITHOUT EXTRA COST TO OWNER.

C. EQUIPMENT DESIGN AND INSTALLATION:
1. UNIFORMITY: UNLESS OTHERWISE SPECIFIED, EQUIPMENT OR MATERIAL OF SAME TYPE OR CLASSIFICATION, USED FOR SAME PURPOSES, SHALL BE PRODUCT OF SAME MANUFACTURER.
2. DESIGN: EQUIPMENT AND ACCESSORIES NOT SPECIFICALLY DESCRIBED OR IDENTIFIED BY MANUFACTURER'S CATALOG NUMBER SHALL BE DESIGNED IN CONFORMITY WITH ASME, IEEE, OR OTHER APPLICABLE TECHNICAL STANDARDS, SUITABLE FOR MAXIMUM WORKING PRESSURE, AND WITH NEAT AND FINISHED APPEARANCE.
3. INSTALLATION: ERECT EQUIPMENT ALIGNED, LEVEL AND ADJUSTED FOR SATISFACTORY OPERATION. INSTALL SO THAT CONNECTING AND DISCONNECTING OF PIPING AND ACCESSORIES CAN BE MADE READILY, AND SO THAT PARTS ARE EASILY ACCESSIBLE FOR INSPECTION, OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM INDICATED ARRANGEMENTS MAY BE MADE, AS APPROVED.

D. HANGING OF EQUIPMENT AND PIPING:
1. SUPPORT EQUIPMENT AND PIPING FROM THE TOP CHORD OF BAR JOISTS AT THE "PANEL POINTS" OR FROM THE TOP FLANGE OF BEAMS. PIPING 2-INCH (50 MM) NOMINAL AND SMALLER MAY BE SUPPORTED FROM THE BOTTOM CHORD OF THE BAR JOISTS AT THE "PANEL POINTS" OR FROM THE BOTTOM FLANGE OF THE BEAMS.

E. PROTECTION OF EQUIPMENT AND MATERIALS: RESPONSIBILITY FOR CARE AND PROTECTION OF MATERIALS AND MECHANICAL WORK RESTS WITH THE CONTRACTOR UNTIL THE ENTIRE PROJECT HAS BEEN COMPLETED, TESTED AND THE PROJECT IS ACCEPTED BY THE OWNER.

F. FOUNDATIONS:
1. CEILING MOUNTING: WHERE CEILING MOUNTING IS INDICATED OR SPECIFIED, USE SUSPENDED PLATFORM OR STRAP HANGERS, BRACKET OR SHELF, WHICHEVER IS MOST SUITABLE FOR EQUIPMENT AND ITS LOCATION. CONSTRUCT OF STRUCTURAL STEEL MEMBERS, STEEL PLATES, OR RODS, AS REQUIRED; BRACE AND FASTEN TO BUILDING STRUCTURE OR TO INSERTS AS APPROVED, OR AS DETAILED.
2. WHERE FLOOR MOUNTING IS INDICATED, LOCATE EQUIPMENT ON 4 INCH HIGH REINFORCED CONCRETE PAD OF ADEQUATE SIZE WITH ANCHORS AND BASE PLATES AS REQUIRED, ON PRESSURE-TREATED SLEEPERS, OR ON STRUCTURAL STEEL FRAME AS DETAILED. THE CORNERS OF PADS SHALL BE CHAMFERED 1 INCH. PAD AND STEEL SIZES AND LOCATION SHALL BE COORDINATED WITH THE APPROVED EQUIPMENT.

1.5 ACCESS PANELS

A. ACCESS PANELS REQUIRED FOR ITEMS FURNISHED UNDER DIVISION 22 SHALL BE PROVIDED UNDER THIS DIVISION.

B. MANUFACTURER, AND MODEL OF STANDARD DOORS: J. L. INDUSTRIES, INC., MODEL WB; KARP ASSOCIATES, INC., MODEL KDW; OR THE WILLIAMS BROTHERS CORPORATION OF AMERICA, MODEL WB-DW.

C. ACCESS PANELS SHALL BE STANDARD PANELS, 12 INCH X 16 INCH (305 MM X 406 MM) MINIMUM UNLESS INDICATED OTHERWISE. PANELS INSTALLED IN AREAS OF HIGH MOISTURE CONCENTRATION, SUCH AS TOILET ROOMS, NEAR PLUMBING FIXTURES, FOOD PREPARATION AREAS, OR OUTDOORS, SHALL BE FABRICATED OF PAINTABLE STAINLESS STEEL OR ALUMINUM FOR CORROSION RESISTANCE.

D. DOORS AND FRAMES SHALL BE FACTORY PRIMED. LATCHES SHALL BE OPERATED BY TUMBLER LOCK, KEYED ALIKE, FURNISH 3 KEYS TO THE OWNER.

E. ACCESS PANELS IN FIRE-RATED CONSTRUCTION SHALL HAVE THE SAME UL RATING AS THE BUILDING ASSEMBLY IN WHICH THEY ARE INSTALLED.

F. PROVIDE ACCESS PANELS IN BUILDING CONSTRUCTION WHERE REQUIRED FOR ACCESS TO COMPONENTS SUCH AS VALVES, AIR VENTS, DRAINS, ACTUATORS, AND OTHER RELATED ITEMS.

1.6 ELECTRIC WORK

A. PROVIDE MOTORS, PILOT LIGHTS, CONTROLLERS, LIMIT SWITCHES, AND OTHER RELATED ITEMS FOR EQUIPMENT PROVIDED UNDER DIVISION 22.

B. EXCEPT AS NOTED, REQUIRED LINE SWITCHES, FUSED SWITCHES, AND OTHER RELATED ITEMS AND NECESSARY WIRING TO PROPERLY CONNECT EQUIPMENT TO MOTORS AND SWITCHES SHALL BE FURNISHED AND INSTALLED UNDER DIVISION 26, ELECTRIC.

C. PROVIDE COMPLETE WIRING SYSTEM FOR AUTOMATIC CONTROLS AS SPECIFIED UNDER SECTION DIVISION 23 SECTION "INSTRUMENTATION AND CONTROLS FOR MECHANICAL SYSTEMS."

D. WIRING SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE.

1.7 SUBMITTALS

A. AFTER AWARD OF CONTRACT AND BEFORE INSTALLATION, SUBMIT FOR APPROVAL SHOP DRAWINGS, BULLETINS, PRODUCT DATA, SAMPLES, AND OTHER RELATED ITEMS.

B. SUBMIT SHOP DRAWINGS AND PRODUCT DATA AS REQUIRED IN EACH SECTION. SUBMITTAL SHALL INCLUDE PHYSICAL DATA AND PERFORMANCE DATA REQUIRED TO VERIFY COMPLIANCE WITH THE CONTRACT DOCUMENTS.

C. SUBMIT SAMPLES AS REQUIRED IN EACH SECTION, AND AS INDICATED ON THE DRAWINGS. THESE WILL GENERALLY BE RETAINED BY THE ARCHITECT/ENGINEER, UNLESS OTHERWISE INDICATED. CONTRACTOR MAY REQUEST THESE ITEMS RETURNED; PROVIDE RETURN SHIPPING FOR RETURNS.

D. SUBMIT MOCK-UPS AS REQUIRED IN EACH SECTION, AND AS INDICATED ON THE DRAWINGS. FOR GENERAL MOCK-UP PROCEDURES, REFER TO DIVISION 01 SECTION "QUALITY REQUIREMENTS." DELIVER TO THE ARCHITECT/ENGINEER FOR REVIEW IF SO INDICATED. PROVIDE RETURN SHIPPING.

E. ARCHITECT/ENGINEER'S REVIEW WILL NOT INCLUDE THE REVIEW, COORDINATION, OR VERIFICATION OF DIMENSIONS OR QUANTITIES; THESE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

1.8 SUBSTITUTIONS

A. COMPLY WITH PROVISIONS OF THE INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS (OR GENERAL REQUIREMENTS).

B. MATERIALS SHALL BE AS SPECIFIED HEREIN, EXCEPT, CONSIDERATION SHALL BE GIVEN TO OTHER PRODUCTS THAT MEET OR EXCEED THOSE SPECIFIED IF REQUESTED FIVE (5) BUSINESS DAYS PRIOR TO THE DATE OF BID OPENING.

C. THE FIRST ITEM LISTED UNDER "ACCEPTABLE MANUFACTURERS", "APPROVED MANUFACTURERS" OR "MANUFACTURERS" IS THE DESIGN BASIS.
1. OTHER MANUFACTURERS LISTED MAY BE USED IN THE BASE BID, BUT CONFORMANCE WITH DETAILS OF THE SPECIFICATIONS, AS WELL AS DIMENSIONAL AND ELECTRICAL DATA, SHALL BE VERIFIED BY THE CONTRACTOR.
2. ARCHITECT/ENGINEER HAS NOT VERIFIED THAT EACH LISTED MANUFACTURER HAS THE ABILITY TO PROVIDE AN ACCEPTABLE SUBSTITUTION FOR THE BASIS-OF-DESIGN PRODUCT. CONTRACTOR MAY NOT ASSUME THAT SUBSTITUTIONS WILL BE APPROVED.
3. MODIFICATIONS REQUIRED AS A RESULT OF DIFFERENCES BETWEEN THE DESIGN BASIS ITEM AND THE SUBMITTED AND APPROVED ITEM MUST BE APPROVED BY THE ARCHITECT AND MADE AT THE CONTRACTOR'S EXPENSE. AS AN EXAMPLE, IF A ROOFTOP HVAC UNIT IS SUBMITTED AND APPROVED AND IF THE UNIT'S DIMENSIONS AND WEIGHT ARE DIFFERENT FROM THOSE OF THE UNIT WHICH WAS USED AS THE DESIGN BASIS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR BUILDING STRUCTURAL MODIFICATIONS REQUIRED TO ACCOMMODATE THE SUBMITTED AND APPROVED UNIT, AT NO ADDITIONAL COST TO THE OWNER.
4. WHEN, IN THE ARCHITECT OR ENGINEER'S OPINION, ARCHITECTURAL OR ENGINEERING SERVICES ARE NECESSARY FOR THE COORDINATION OF SUBSTITUTED ITEMS, THE CONTRACTOR SHALL REIMBURSE THE OWNER FOR THE COST OF THESE SERVICES.
5. FOR ITEMS WHICH HAVE NO MANUFACTURERS LISTED, ANY ITEM CONFORMING WITH THE CONTRACT DOCUMENTS IS ACCEPTABLE.

D. SUBSTITUTIONS FROM MANUFACTURERS OR PROVIDERS WHICH ARE NOT LISTED MAY BE PROPOSED WITHIN THE TIME ALLOWED IN THE GENERAL CONDITIONS OF THE SPECIFICATIONS.
1. THE EXCEPTION TO THIS IS PRODUCTS FOR WHICH THE LIST OF MANUFACTURERS OR PROVIDERS IS LIMITED BY THE WORDING "NO SUBSTITUTIONS" OR SIMILAR WORDING.

1.9 COORDINATION

A. COORDINATE SCHEDULING, SUBMITTALS, AND WORK OF THE VARIOUS SECTIONS OF SPECIFICATIONS TO ASSURE EFFICIENT AND ORDERLY SEQUENCE OF INSTALLATION OF INTERDEPENDENT CONSTRUCTION ELEMENTS, WITH PROVISIONS FOR ACCOMMODATING ITEMS INSTALLED LATER.

B. VERIFY THAT UTILITY REQUIREMENT CHARACTERISTICS OF OPERATING EQUIPMENT ARE COMPATIBLE WITH BUILDING UTILITIES. COORDINATE WORK OF VARIOUS DIVISIONS HAVING INTERDEPENDENT RESPONSIBILITIES FOR INSTALLING, CONNECTING TO, AND PLACING IN SERVICE, SUCH EQUIPMENT.

C. COORDINATE SPACE REQUIREMENTS AND INSTALLATION OF PLUMBING AND ELECTRICAL WORK WHICH ARE INDICATED DIAGRAMMATICALLY ON DRAWINGS. FOLLOW ROUTING SHOWN FOR PIPES AND CONDUIT, AS CLOSELY AS PRACTICABLE; PLACE RUNS PARALLEL WITH LINE OF BUILDING. UTILIZE SPACES EFFICIENTLY TO MAXIMIZE ACCESSIBILITY FOR OTHER INSTALLATIONS, FOR MAINTENANCE, AND FOR REPAIRS.

D. IN FINISHED AREAS, CONCEAL PIPES AND WIRING WITHIN THE CONSTRUCTION. COORDINATE LOCATIONS OF FIXTURES AND OUTLETS WITH FINISH ELEMENTS.

E. COORDINATE COMPLETION AND CLEAN-UP OF WORK OF SEPARATE SECTIONS IN PREPARATION FOR SUBSTANTIAL COMPLETION.

F. AFTER OWNER OCCUPANCY OF PREMISES, COORDINATE ACCESS TO SITE FOR CORRECTION OF DEFECTIVE WORK AND WORK NOT IN ACCORDANCE WITH CONTRACT DOCUMENTS, TO MINIMIZE DISRUPTION OF OWNER'S ACTIVITIES.

1.10 REQUESTS FOR ARCHITECT'S CADD DRAWINGS

A. IN LIEU OF GENERATING THEIR OWN CADD DRAWINGS, THE CONTRACTOR MAY ELECT TO USE THE ARCHITECT'S ELECTRONIC COPIES OF CADD DRAWINGS FOR THE PURPOSE OF DEVELOPING COORDINATION DRAWINGS, DEVELOPING CONTROL SYSTEM GRAPHICS OR FOR OTHER REASONS THAT PERTAIN TO THE REQUIREMENTS OF THIS CONTRACT. IF THE CONTRACTOR ELECTS TO UTILIZE THE ARCHITECT'S ELECTRONIC COPIES OF CADD DRAWINGS, THE ELECTRONIC FILES SHALL BE PURCHASED FROM THE ARCHITECT AT THE ARCHITECT'S CURRENT BILLING RATE PER DRAWING. THE CONTRACTOR SHALL PROVIDE PAYMENT AND SHALL SIGN A RELEASE-OF-LIABILITY FORM BEFORE ELECTRONIC CADD DRAWINGS ARE RELEASED.

1.11 CLEANING

A. REMOVE DEBRIS FROM SITE DAILY.

B. MATERIAL AND PIECES OF EQUIPMENT SHALL BE TURNED OVER TO THE OWNER FREE OF DUST AND DIRT, BOTH INSIDE AND OUT.

C. AT THE COMPLETION OF THE PROJECT, EQUIPMENT SHALL HAVE A CLEAN, NEAT APPEARANCE OF FACTORY FINISH BY CLEANING OR REPAINTING AS REQUIRED.

D. AT THE COMPLETION OF THE PROJECT, SURFACES EXPOSED TO VIEW SHALL HAVE A CLEAN, NEAT APPEARANCE OF FINISH FREE FROM SMUDGES AND SCRATCHES BY CLEANING OR REPAINTING AS REQUIRED.

1.12 STARTING SYSTEMS

A. COORDINATE SCHEDULE FOR START-UP OF VARIOUS EQUIPMENT AND SYSTEMS.

B. NOTIFY ARCHITECT/ENGINEER 7 DAYS PRIOR TO START-UP OF EACH ITEM.

C. VERIFY THAT EACH PIECE OF EQUIPMENT OR SYSTEM HAS BEEN CHECKED FOR PROPER LUBRICATION, DRIVE ROTATION, BELT TENSION, CONTROL SEQUENCE, OR OTHER CONDITIONS WHICH MAY CAUSE DAMAGE.

D. VERIFY THAT TESTS, METER READINGS, AND SPECIFIED ELECTRICAL CHARACTERISTICS AGREE WITH THOSE REQUIRED BY THE EQUIPMENT OR SYSTEM MANUFACTURER.

E. VERIFY THAT WIRING AND SUPPORT COMPONENTS FOR EQUIPMENT ARE COMPLETE AND TESTED.

F. EXECUTE START-UP UNDER SUPERVISION OF RESPONSIBLE MANUFACTURER'S REPRESENTATIVE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

G. WHEN SPECIFIED IN INDIVIDUAL SPECIFICATION SECTIONS, REQUIRE MANUFACTURER TO PROVIDE AUTHORIZED REPRESENTATIVE TO BE PRESENT AT SITE TO INSPECT, CHECK, AND APPROVE EQUIPMENT OR SYSTEM INSTALLATION PRIOR TO START-UP, AND TO SUPERVISE PLACING EQUIPMENT OR SYSTEM IN OPERATION.

H. SUBMIT A WRITTEN REPORT THAT EQUIPMENT OR SYSTEM HAS BEEN PROPERLY INSTALLED AND IS FUNCTIONING CORRECTLY.

1.13 ADJUSTMENTS AND OWNER'S INSTRUCTIONS

A. AFTER COMPLETION OF THE INSTALLATION WORK CALLED FOR IN THE CONTRACT DOCUMENTS, FURNISH NECESSARY MECHANICS OR ENGINEERS FOR THE ADJUSTMENT AND OPERATION OF THE SYSTEMS, TO THE END THAT THE SYSTEMS ARE PERFECTLY ADJUSTED AND TURNED OVER TO THE OWNER IN PERFECT WORKING ORDER. FURTHER INSTRUCT THE OWNER'S AUTHORIZED REPRESENTATIVE IN THE CARE AND OPERATION OF THE INSTALLATION, PROVIDING FRAMED INSTRUCTION CHARTS, DIRECTIONS, AND OTHER RELATED ITEMS.

B. INSTRUCTORS PROVIDING OWNER TRAINING SHALL BE EXPERIENCED AND FAMILIAR WITH JOBSITE.

1.14 TESTING

A. AFTER THE ENTIRE INSTALLATION IS COMPLETED AND READY FOR OPERATION, TEST THE SYSTEMS AS OUTLINED IN DIVISION 23 SECTION "TESTING, ADJUSTING AND BALANCING FOR MECHANICAL SYSTEMS." THESE TESTS ARE SUPPLEMENTARY TO DETAILED TESTS SPECIFIED HEREIN OR DIRECTED. THE OWNER WILL PROVIDE WATER AND ELECTRIC CURRENT FOR THE TEST. PROVIDE NECESSARY LABOR, TEST PUMP, GAUGES, METERS, OTHER INSTRUMENTS, AND MATERIALS. PERFORM TESTS IN THE PRESENCE OF THE ARCHITECT OR HIS REPRESENTATIVE.

B. PERFORM OTHER TESTS SPECIFIED IN INDIVIDUAL SECTIONS OF THIS SPECIFICATION.

1.15 COMPLETION OF SYSTEMS

A. THE FOLLOWING PLUMBING SYSTEMS SHALL NOT BE COMPLETE UNTIL THE FOLLOWING CONDITIONS ARE SATISFIED:
1. PIPING SYSTEMS:
   A. PIPING, VALVES AND ACCESSORIES SHALL BE COMPLETELY INSTALLED, INSULATED AND LABELED AS SPECIFIED.
   B. PIPING PRESSURE TESTING BE COMPLETED AND PRESSURE TESTING REPORTS SHALL BE SUBMITTED AND APPROVED.
   C. PIPING SYSTEMS SHALL BE BALANCED AND A BALANCING REPORT SHALL BE SUBMITTED AND APPROVED.
2. EQUIPMENT:
   A. EQUIPMENT, INCLUDING BUT NOT LIMITED TO PLUMBING FIXTURES, PUMPS, AND WATER HEATERS, SHALL BE COMPLETELY INSTALLED.
   B. EQUIPMENT START-UP REPORTS SHALL BE COMPLETED, SUBMITTED AND APPROVED.
   C. EQUIPMENT BALANCING SHALL BE COMPLETED AND THE BALANCING REPORT SHALL BE SUBMITTED AND APPROVED.
3. AUTOMATIC CONTROLS:
   A. AUTOMATIC CONTROLS SHALL BE COMPLETELY INSTALLED.
   B. CONTROLS SHALL OPERATE IN AN AUTOMATIC MODE FOR A MINIMUM OF 2 MONTHS DURING OWNER OCCUPANCY WITHOUT SUBSTANTIAL DEFICIENCIES.

1.16 OPERATING AND MAINTENANCE MANUALS

A. FURNISH 2 BOUND OPERATING AND MAINTENANCE MANUALS AND FORWARD TO THE ARCHITECT FOR REVIEW AND TRANSMITTAL TO THE OWNER.

B. FOR MAINTENANCE PURPOSES, PROVIDE APPROVED SUBMITTALS, PARTS LISTS, SPECIFICATIONS, AND MANUFACTURER'S MAINTENANCE BULLETINS FOR EACH PIECE OF EQUIPMENT. FOR MATERIALS USED WHICH HAVE BEEN SUBMITTED TO THE ARCHITECT FOR APPROVAL BUT DO NOT REQUIRE REGULAR MAINTENANCE, SUCH AS PIPING AND INSULATION, PROVIDE ONE COPY OF APPROVED SUBMITTALS.

C. PROVIDE NAME, ADDRESS AND TELEPHONE NUMBER OF THE MANUFACTURER'S REPRESENTATIVE AND SERVICE COMPANY, FOR EACH PIECE OF EQUIPMENT OR MATERIAL SO THAT SERVICE OR SPARE PARTS CAN BE READILY OBTAINED.

1.17 WARRANTY

A. PROVIDE GUARANTEES AND WARRANTIES FOR WORK UNDER THIS CONTRACT AS INDICATED IN THE GENERAL REQUIREMENTS OF THE CONTRACT.

B. PROVIDE MANUFACTURERS' STANDARD WARRANTIES AND GUARANTEES FOR WORK BY THE PLUMBING TRADES. HOWEVER, SUCH WARRANTIES AND GUARANTEES SHALL BE IN ADDITION TO AND NOT IN LIEU OF OTHER LIABILITIES WHICH THE MANUFACTURER AND THE MECHANICAL CONTRACTOR MAY HAVE BY LAW OR BY OTHER PROVISIONS OF THE CONTRACT DOCUMENTS.

C. GUARANTEE THAT ELEMENTS OF THE SYSTEMS PROVIDED UNDER THIS CONTRACT ARE OF SUFFICIENT CAPACITY TO MEET THE SPECIFIED PERFORMANCE REQUIREMENTS AS SET FORTH IN THESE SPECIFICATIONS OR AS INDICATED ON THE DRAWINGS.

D. UPON RECEIPT OF NOTICE FROM THE OWNER OF FAILURE OF ANY PART OF THE PLUMBING SYSTEMS OR EQUIPMENT DURING THE WARRANTY PERIOD, THE PLUMBING SUBCONTRACTOR SHALL REPLACE THE AFFECTED PART OR PARTS.

E. FURNISH A WRITTEN GUARANTEE COVERING THE ABOVE REQUIREMENTS BEFORE SUBMITTING THE APPLICATION FOR FINAL PAYMENT..

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 220500

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. SLEEVES.
2. SLEEVE-SEAL SYSTEMS.
3. GROUT.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

PART 2 - PRODUCTS

2.1 SLEEVES

A. CAST-IRON WALL PIPES: CAST OR FABRICATED OF CAST OR DUCTILE IRON AND EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTEGRAL WATERSTOP UNLESS OTHERWISE INDICATED.

B. GALVANIZED-STEEL WALL PIPES: ASTM A53/A53M, SCHEDULE 40, WITH PLAIN ENDS AND WELDED STEEL COLLAR; ZINC COATED.

C. GALVANIZED-STEEL-PIPE SLEEVES: ASTM A53/A53M, TYPE E, GRADE B, SCHEDULE 40, ZINC COATED, WITH PLAIN ENDS.

2.2 SLEEVE-SEAL SYSTEMS

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. ADVANCE PRODUCTS & SYSTEMS, INC.
2. CALPICO, INC.
3. GPT; AN ENPRO INDUSTRIES COMPANY.
4. METRAFLEX COMPANY (THE).
5. PROCO PRODUCTS, INC.

B. DESCRIPTION: MODULAR SEALING-ELEMENT UNIT, DESIGNED FOR FIELD ASSEMBLY, FOR FILLING ANNULAR SPACE BETWEEN PIPING AND SLEEVE.
1. SEALING ELEMENTS: EPDM-RUBBER OR NBR INTERLOCKING LINKS SHAPED TO FIT SURFACE OF PIPE. INCLUDE TYPE AND NUMBER REQUIRED FOR PIPE MATERIAL AND SIZE OF PIPE.
2. PRESSURE PLATES: STAINLESS STEEL.
3. CONNECTING BOLTS AND NUTS: STAINLESS STEEL OF LENGTH REQUIRED TO SECURE PRESSURE PLATES TO SEALING ELEMENTS.

2.3 GROUT

A. STANDARD: ASTM C 1107/C 1107M, GRADE B, POST-HARDENING AND VOLUME-ADJUSTING, DRY, HYDRAULIC-CEMENT GROUT.

B. CHARACTERISTICS: NONSHRINK; RECOMMENDED FOR INTERIOR AND EXTERIOR APPLICATIONS.

C. DESIGN MIX: 5000-PSI (34.5-MPA), 28-DAY COMPRESSIVE STRENGTH.

D. PACKAGING: PREMIXED AND FACTORY PACKAGED.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. INSTALL SLEEVES FOR PIPING PASSING THROUGH PENETRATIONS IN FLOORS, PARTITIONS, ROOFS, AND WALLS.

B. FOR SLEEVES THAT WILL HAVE SLEEVE-SEAL SYSTEM INSTALLED, SELECT SLEEVES OF SIZE LARGE ENOUGH TO PROVIDE 1-INCH (25-MM) ANNULAR CLEAR SPACE BETWEEN PIPING AND CONCRETE SLABS AND WALLS. SLEEVES ARE NOT REQUIRED FOR CORE-DRILLED HOLES IN CONCRETE FOUNDATION WALLS.

C. INSTALL SLEEVES IN CONCRETE FLOORS, CONCRETE ROOF SLABS, AND CONCRETE WALLS AS NEW SLABS AND WALLS ARE CONSTRUCTED.
1. CUT SLEEVES TO LENGTH FOR MOUNTING FLUSH WITH BOTH SURFACES.
   A. EXCEPTION: EXTEND SLEEVES INSTALLED IN FLOORS OF PIPING CHASES, MECHANICAL EQUIPMENT AREAS, AND OTHER WET AREAS 2 INCHES (50 MM) ABOVE FINISHED FLOOR LEVEL.
2. USING GROUT, SEAL THE SPACE OUTSIDE OF SLEEVES IN SLABS AND WALLS WITHOUT SLEEVE-SEAL SYSTEM.

D. INSTALL SLEEVES FOR PIPES PASSING THROUGH INTERIOR PARTITIONS.
1. CUT SLEEVES TO LENGTH FOR MOUNTING FLUSH WITH BOTH SURFACES.
2. INSTALL SLEEVES THAT ARE LARGE ENOUGH TO PROVIDE 1/4-INCH (6.4-MM) ANNULAR CLEAR SPACE BETWEEN SLEEVE AND PIPE OR PIPE INSULATION.
3. SEAL ANNULAR SPACE BETWEEN SLEEVE AND PIPING OR PIPING INSULATION; USE JOINT SEALANTS APPROPRIATE FOR SIZE, DEPTH, AND LOCATION OF JOINT. COMPLY WITH REQUIREMENTS FOR SEALANTS SPECIFIED IN SECTION 079200 "JOINT SEALANTS."

E. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRESTOP MATERIALS. COMPLY WITH REQUIREMENTS FOR FIRESTOPPING SPECIFIED IN SECTION 078413 "PENETRATION FIRESTOPPING."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. INSTALL SLEEVE-SEAL SYSTEMS IN SLEEVES IN EXTERIOR CONCRETE WALLS AND SLABS-ON-GRADE AT SERVICE PIPING ENTRIES INTO BUILDING.

B. SELECT TYPE, SIZE, AND NUMBER OF SEALING ELEMENTS REQUIRED FOR PIPING MATERIAL AND SIZE AND FOR SLEEVE ID OR HOLE SIZE. POSITION PIPING IN CENTER OF SLEEVE. CENTER PIPING IN PENETRATION, ASSEMBLE SLEEVE-SEAL SYSTEM COMPONENTS, AND INSTALL IN ANNULAR SPACE BETWEEN PIPING AND SLEEVE. TIGHTEN BOLTS AGAINST PRESSURE PLATES THAT CAUSE SEALING ELEMENTS TO EXPAND AND MAKE A WATERTIGHT SEAL.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. USE SLEEVES AND SLEEVE SEALS FOR THE FOLLOWING PIPING-PENETRATION APPLICATIONS:
1. EXTERIOR CONCRETE WALLS ABOVE GRADE: CAST-IRON WALL SLEEVES.
2. EXTERIOR CONCRETE WALLS BELOW GRADE: CAST-IRON WALL SLEEVES WITH SLEEVE-SEAL SYSTEM. SELECT SLEEVE SIZE TO ALLOW FOR 1 INCH ANNULAR CLEAR SPACE BETWEEN PIPING AND SLEEVE FOR INSTALLING SLEEVE-SEAL SYSTEM.
3. CONCRETE SLABS ON GRADE: CAST-IRON SLEEVES WITH SLEEVE-SEAL SYSTEM. SELECT SLEEVE SIZE TO ALLOW FOR 1 INCH ANNULAR CLEAR SPACE BETWEEN PIPING AND SLEEVE FOR INSTALLING SLEEVE-SEAL SYSTEM.
4. CONCRETE SLABS ABOVE GRADE: GALVANIZED-STEEL-PIPE SLEEVES.
5. INTERIOR PARTITIONS: GALVANIZED-STEEL-PIPE SLEEVES.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. ESCUTCHEONS.
2. FLOOR PLATES.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. ONE-PIECE, CAST-BRASS TYPE: WITH POLISHED, CHROME-PLATED FINISH AND SETSCREW FASTENER.

B. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

C. SPLIT-CASTING BRASS TYPE: WITH POLISHED, CHROME-PLATED FINISH AND WITH CONCEALED HINGE AND SETSCREW.

D. ONE-PIECE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH AND SPRING-CLIP FASTENERS.

E. SPLIT-PLATE, STAMPED-STEEL TYPE: WITH CHROME-PLATED FINISH AND CONCEALED HINGE

F. STAINLESS STEEL: MAY BE SUBSTITUTED FOR OTHER MATERIALS.

2.2 FLOOR PLATES

A. ONE-PIECE FLOOR PLATES: CAST-IRON FLANGE WITH HOLES FOR FASTENERS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FINISHED FLOORS.

B. INSTALL ESCUTCHEONS WITH ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF PIPING AND WITH OD THAT COMPLETELY COVERS OPENING.
1. ESCUTCHEONS FOR PIPING:
   A. PIPING AT PLUMBING FIXTURES AND EQUIPMENT AND OTHER POTENTIALLY DAMP LOCATIONS: BRASS OR STAINLESS STEEL ONLY; STEEL IS NOT ALLOWED.
   B. PIPING WITH FITTING OR SLEEVE PROTRUDING FROM WALL: ONE-PIECE, DEEP-PATTERN TYPE.
   C. INSULATED PIPING: STEEL OR BRASS.
   D. BARE PIPING AT FLOOR PENETRATIONS IN FINISHED SPACES: BRASS.
   E. BARE PIPING AT WALL PENETRATIONS IN FINISHED SPACES: BRASS OR STEEL.
   F. BARE PIPING AT CEILING PENETRATIONS IN FINISHED SPACES: BRASS OR STEEL.
   G. BARE PIPING IN UNFINISHED SERVICE SPACES: BRASS.
   H. BARE PIPING IN EQUIPMENT ROOMS: BRASS WITH ROUGH-BRASS FINISH.

C. INSTALL FLOOR PLATES FOR PIPING PENETRATIONS OF EQUIPMENT-ROOM AND PIPING CHASE FLOORS.
1. INSTALL FLOOR PLATES WITH ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF PIPING AND WITH OD THAT COMPLETELY COVERS OPENING.
   A. NEW PIPING: ONE-PIECE, FLOOR-PLATE TYPE.
   B. EXISTING PIPING: SPLIT-CASTING, FLOOR-PLATE TYPE.

3.2 FIELD QUALITY CONTROL

A. REPLACE BROKEN AND DAMAGED ESCUTCHEONS AND FLOOR PLATES USING NEW MATERIALS.

B. EXISTING PIPING: VERIFY THAT EACH PENETRATION IN RENOVATED AREAS, AND AREAS WHERE EXISTING PIPING IS MODIFIED OR INSULATED, IS PROVIDED WITH AN ESCUTCHEON.

END OF SECTION 220518

SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. FILLED-SYSTEM THERMOMETERS.
2. THERMOWELLS.
3. DIAL-TYPE PRESSURE GAGES.
4. GAGE ATTACHMENTS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

PART 2 - PRODUCTS

2.1 FILLED-SYSTEM THERMOMETERS

A. DIRECT-MOUNTED, METAL-CASE, VAPOR-ACTUATED THERMOMETERS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   A. WEISS INSTRUMENTS, INC. – MODEL 35VA.
   B. ASHCROFT INC.
   C. TRERICE, H. O. CO.
2. STANDARD: ASME B40.200.
3. CASE: SEALED TYPE, CAST ALUMINUM OR DRAWN STEEL; 4-1/2-INCH (114-MM) NOMINAL DIAMETER.
4. ELEMENT: BOURDON TUBE OR OTHER TYPE OF PRESSURE ELEMENT.
5. MOVEMENT: MECHANICAL, WITH LINK TO PRESSURE ELEMENT AND CONNECTION TO POINTER.
6. DIAL: NONREFLECTIVE ALUMINUM WITH PERMANENTLY ETCHED SCALE MARKINGS GRADUATED IN DEG F AND DEG C.
7. POINTER: DARK-COLORED METAL.
8. WINDOW: GLASS OR PLASTIC.
9. RING: STAINLESS STEEL.
10. CONNECTOR TYPE(S): UNION JOINT, ADJUSTABLE, 180 DEGREES IN VERTICAL PLANE, 360 DEGREES IN HORIZONTAL PLANE, WITH LOCKING DEVICE; WITH ASME B1.1 SCREW THREADS.
11. THERMAL SYSTEM: LIQUID-FILLED BULB IN COPPER-PLATED STEEL, ALUMINUM, OR BRASS STEM AND OF LENGTH TO SUIT INSTALLATION.
   A. DESIGN FOR THERMOWELL INSTALLATION: BARE STEM.
   B. THERMOMETER STEMS OF LENGTH TO MATCH THERMOWELL INSERTION LENGTH.
12. ACCURACY: PLUS OR MINUS 1 PERCENT OF SCALE RANGE.

2.2 THERMOWELLS

A. THERMOWELLS:
1. STANDARD: ASME B40.200.
2. DESCRIPTION: PRESSURE-TIGHT, SOCKET-TYPE FITTING MADE FOR INSERTION INTO PIPING TEE FITTING.
3. MATERIAL FOR USE WITH COPPER TUBING: BRASS.
4. MATERIAL FOR USE WITH STEEL PIPING: STEEL, STAINLESS STEEL, OR BRASS.
5. TYPE: STEPPED SHANK UNLESS STRAIGHT OR TAPERED SHANK IS INDICATED.
6. EXTERNAL THREADS: NPS 1/2, NPS 3/4, OR NPS 1, (DN 15, DN 20, OR NPS 25,) ASME B1.20.1 PIPE THREADS.
7. INTERNAL THREADS: 1/2, 3/4, AND 1-INCH (13, 19, AND 25 MM), WITH ASME B1.1 SCREW THREADS.
8. BORE: DIAMETER REQUIRED TO MATCH THERMOMETER BULB OR STEM.
9. INSERTION LENGTH: AS REQUIRED TO MATCH THERMOMETER BULB OR STEM.
10. LAGGING EXTENSION: INCLUDE ON THERMOWELLS FOR INSULATED PIPING AND TUBING.
11. BUSHINGS: FOR CONVERTING SIZE OF THERMOWELL'S INTERNAL SCREW THREAD TO SIZE OF THERMOMETER CONNECTION.

B. HEAT-TRANSFER MEDIUM: MIXTURE OF GRAPHITE AND GLYCERIN. FILL THERMOWELL TO ELIMINATE AIR SPACES.

2.3 PRESSURE GAGES

A. DIRECT-MOUNTED, METAL-CASE, DIAL-TYPE PRESSURE GAGES:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   A. WEISS INSTRUMENTS, INC. – SERIES 4CTS.
   B. ASHCROFT INC.
   C. DWYER INSTRUMENTS, INC.
   D. MARSH BELLOFRAM.
   E. PALMER WAHL INSTRUMENTATION GROUP.
   F. TRERICE, H. O. CO.
2. STANDARD: ASME B40.100.
3. CASE: SEALED TYPE(S); STAINLESS STEEL; 4-1/2-INCH (114-MM) NOMINAL DIAMETER FOR GENERAL SERVICE; 2-1/2-INCH (63-MM) FOR LP GAS SERVICE.
4. PRESSURE-ELEMENT ASSEMBLY: BOURDON TUBE UNLESS OTHERWISE INDICATED.
5. PRESSURE CONNECTION: BRASS, WITH NPS 1/4 OR NPS 1/2 (DN 8 OR DN 15), ASME B1.20.1 PIPE THREADS AND BOTTOM-OUTLET TYPE UNLESS BACK-OUTLET TYPE IS INDICATED.
6. MOVEMENT: MECHANICAL, WITH LINK TO PRESSURE ELEMENT AND CONNECTION TO POINTER.
7. DIAL: NONREFLECTIVE ALUMINUM WITH PERMANENTLY ETCHED SCALE MARKINGS GRADUATED IN PSI AND KPA, EXCEPT AS SCHEDULED.
8. POINTER: DARK-COLORED METAL.
9. WINDOW: GLASS OR PLASTIC.
10. RING: STAINLESS STEEL.
11. ACCURACY: GRADE A, PLUS OR MINUS 1 PERCENT OF MIDDLE HALF OF SCALE RANGE FOR GENERAL SERVICE; UP TO 1.5 PERCENT OF FULL SCALE FOR LP GAS SERVICE.

2.4 GAGE ATTACHMENTS

A. SNUBBERS: ASME B40.100, BRASS; WITH NPS 1/4 OR NPS 1/2 (DN 8 OR DN 15), ASME B1.20.1 PIPE THREADS AND SURGE-DAMPENING DEVICE. INCLUDE EXTENSION FOR USE ON INSULATED PIPING.

B. VALVES: BRASS BALL, WITH NPS 1/4 OR NPS 1/2 (DN 8 OR DN 15), ASME B1.20.1 PIPE THREADS.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL THERMOWELLS WITH SOCKET EXTENDING A MINIMUM OF 2 INCHES INTO FLUID AND IN VERTICAL POSITION IN PIPING TEES.

B. INSTALL THERMOWELLS OF SIZES REQUIRED TO MATCH THERMOMETER CONNECTORS. INCLUDE BUSHINGS IF REQUIRED TO MATCH SIZES.

C. INSTALL THERMOWELLS WITH EXTENSION ON INSULATED PIPING.

D. FILL THERMOWELLS WITH HEAT-TRANSFER MEDIUM.

E. INSTALL DIRECT-MOUNTED THERMOMETERS IN THERMOWELLS AND ADJUST VERTICAL AND TILTED POSITIONS.

F. INSTALL DIRECT-MOUNTED PRESSURE GAGES IN PIPING TEES WITH PRESSURE GAGE LOCATED ON PIPE AT THE MOST READABLE POSITION.

G. INSTALL VALVE AND SNUBBER IN PIPING FOR EACH PRESSURE GAGE FOR FLUIDS.

H. INSTALL TEST PLUGS IN PIPING TEES.

I. INSTALL THERMOMETERS WHERE INDICATED ON THE DRAWINGS.

J. INSTALL PRESSURE GAGES IN THE FOLLOWING LOCATIONS:
1. SUCTION AND DISCHARGE OF EACH PUMP; PROVIDE SINGLE GAGE WITH BALL VALVES.

3.2 CONNECTIONS

A. INSTALL METERS AND GAGES ADJACENT TO MACHINES AND EQUIPMENT TO ALLOW SERVICE AND MAINTENANCE OF METERS, GAGES, MACHINES, AND EQUIPMENT.

3.3 ADJUSTING

A. ADJUST FACES OF METERS AND GAGES TO PROPER ANGLE FOR BEST VISIBILITY.

3.4 THERMOMETER SCALE-RANGE SCHEDULE

A. SCALE RANGE FOR DOMESTIC HOT-WATER PIPING: 20 TO 220 DEG F (AND 0 TO PLUS 105 DEG C).

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. SCALE RANGE FOR CIRCULATOR PUMP SERVICE: 0 TO 60 PSI AND 0 TO 400 KPA.

B. SCALE RANGE FOR DOMESTIC WATER MAINS: 0 TO 100 PSI AND 0 TO 690 KPA.

C. SCALE RANGE FOR REDUCED PRESSURE PIPING: 0 TO 60 PSI AND 0 TO 400 KPA.

D. SCALE RANGE FOR REDUCED PRESSURE LP GAS: 0 TO 15 IN. WG AND 0 TO 3.75 KPA (OR 0 TO 28 MM HG).

END OF SECTION 220519

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TOWN OF SANBORNTON · GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED – PROFESSIONAL ENGINEER – 10/20/2021

REVISIONS

SHEET TITLE:

SPECIFICATIONS

P5.1

SPECIFICATIONS P5.1

1/8" = 1'-0" 3/32" = 1'-0" 1/16" = 1'-0"

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SECTION 220523.12 - BALL VALVES FOR PLUMBING PIPING
PART 1 - GENERAL
1.1 SUMMARY
A. SECTION INCLUDES:
1. BRONZE AND BRASS BALL VALVES.
1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF VALVE.
1. CERTIFICATION THAT PRODUCTS COMPLY WITH NSF 61 ANNEX G.
PART 2 - PRODUCTS
2.1 GENERAL REQUIREMENTS FOR VALVES
A. SOURCE LIMITATIONS FOR VALVES: OBTAIN EACH TYPE OF VALVE FROM SINGLE SOURCE FROM SINGLE MANUFACTURER.
B. ASME COMPLIANCE:
1. ASME B1.20.1 FOR THREADS FOR THREADED END VALVES.
2. ASME B16.18 FOR SOLDER-JOINT CONNECTIONS.
3. ASME B31.9 FOR BUILDING SERVICES PIPING VALVES.
C. NSF COMPLIANCE: NSF 61 ANNEX G FOR VALVE MATERIALS FOR POTABLE-WATER SERVICE.
D. BRONZE VALVES SHALL BE MADE WITH DEZINCIFICATION-RESISTANT MATERIALS. BRONZE VALVES MADE WITH COPPER ALLOY (BRASS) CONTAINING MORE THAN 15 PERCENT ZINC ARE NOT PERMITTED.
E. VALVE PRESSURE-TEMPERATURE RATINGS: NOT LESS THAN INDICATED AND AS REQUIRED FOR SYSTEM PRESSURES AND TEMPERATURES.
F. VALVE SIZES: SAME AS UPSTREAM PIPING UNLESS OTHERWISE INDICATED.
G. VALVE ACTUATOR TYPES:
1. HANDLEVER: FOR QUARTER-TURN VALVES SMALLER THAN NPS 4.
H. VALVES IN INSULATED PIPING:
1. INCLUDE 2-INCH STEM EXTENSIONS.
2. EXTENDED OPERATING HANDLES OF NONTHERMAL-CONDUCTIVE MATERIAL AND PROTECTIVE SLEEVES THAT ALLOW OPERATION OF VALVES WITHOUT BREAKING VAPOR SEALS OR DISTURBING INSULATION.
3. MEMORY STOPS THAT ARE FULLY ADJUSTABLE AFTER INSULATION IS APPLIED.
2.2 BRONZE AND BRASS BALL VALVES
A. MANUFACTURERS:
1. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. CONBRACO INDUSTRIES, INC.; APOLLO VALVES.
B. HAMMOND VALVE.
C. MILWAUKEE VALVE COMPANY.
D. NIBCO INC.
E. WATTS REGULATOR CO.; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.
B. TWO-PIECE, BRONZE BALL VALVES WITH FULL PORT AND STAINLESS-STEEL TRIM:
1. DESCRIPTION:
A. STANDARD: MSS SP-110.
B. CWP RATING: 600 PSIG (4,140 KPA).
C. BODY DESIGN: TWO PIECE.
D. BODY MATERIAL: BRONZE.
E. ENDS: THREADED OR SOLDERED.
F. SEATS: PTFE.
G. STEM: STAINLESS STEEL.
H. BALL: STAINLESS STEEL, VENTED.
I. PORT: FULL.
PART 3 - EXECUTION
3.1 VALVE INSTALLATION
A. INSTALL VALVES WITH UNIONS OR FLANGES AT EACH PIECE OF EQUIPMENT ARRANGED TO ALLOW SERVICE, MAINTENANCE, AND EQUIPMENT REMOVAL WITHOUT SYSTEM SHUTDOWN.
B. LOCATE VALVES FOR EASY ACCESS AND PROVIDE SEPARATE SUPPORT WHERE NECESSARY.
C. INSTALL VALVES IN HORIZONTAL PIPING WITH STEM AT OR ABOVE CENTER OF PIPE.
D. INSTALL VALVES IN POSITION TO ALLOW FULL STEM MOVEMENT.
3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS
A. IF VALVES WITH SPECIFIED CWP RATINGS ARE UNAVAILABLE, THE SAME TYPES OF VALVES WITH HIGHER CWP RATINGS MAY BE SUBSTITUTED.
B. SELECT VALVES WITH THE FOLLOWING END CONNECTIONS:
1. FOR COPPER TUBING, NPS 2 AND SMALLER: THREADED, SOLDER-JOINT, OR PRESSURE-SEAL ENDS.
END OF SECTION 220523.12

SECTION 220523.14 - CHECK VALVES FOR PLUMBING PIPING
PART 1 - GENERAL
1.1 SUMMARY
A. SECTION INCLUDES:
1. BRONZE LIFT CHECK VALVES.
2. BRONZE SWING CHECK VALVES.
1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF VALVE.
1. CERTIFICATION THAT PRODUCTS COMPLY WITH NSF 61 ANNEX G.
PART 2 - PRODUCTS
2.1 GENERAL REQUIREMENTS FOR VALVES
A. SOURCE LIMITATIONS FOR VALVES: OBTAIN EACH TYPE OF VALVE FROM SINGLE SOURCE FROM SINGLE MANUFACTURER.
B. ASME COMPLIANCE:
1. ASME B1.20.1 FOR THREADS FOR THREADED END VALVES.
2. ASME B16.18 FOR SOLDER JOINT.
C. NSF COMPLIANCE: NSF 61 ANNEX G FOR VALVE MATERIALS FOR POTABLE-WATER SERVICE.
D. BRONZE VALVES SHALL BE MADE WITH DEZINCIFICATION-RESISTANT MATERIALS. BRONZE VALVES MADE WITH COPPER ALLOY (BRASS) CONTAINING MORE THAN 15 PERCENT ZINC ARE NOT PERMITTED.
E. VALVE PRESSURE-TEMPERATURE RATINGS: NOT LESS THAN INDICATED AND AS REQUIRED FOR SYSTEM PRESSURES AND TEMPERATURES.
F. VALVE SIZES: SAME AS UPSTREAM PIPING UNLESS OTHERWISE INDICATED.
2.2 MANUFACTURERS
A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. APOLLO VALVES; A DIVISION OF CONBRACO INDUSTRIES, INC.
2. HAMMOND VALVE.
3. METRAFLEX COMPANY, THE.
4. MILWAUKEE VALVE COMPANY.
5. NIBCO INC.
6. WATTS REGULATOR CO.; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.
2.3 BRONZE LIFT CHECK VALVES
A. CLASS 125, LIFT CHECK VALVES WITH BRONZE DISC:
1. DESCRIPTION:
A. STANDARD: MSS SP-80, TYPE 1.
B. BODY DESIGN: VERTICAL FLOW.
C. BODY MATERIAL: ASTM B 61 OR ASTM B 62, BRONZE.
D. ENDS: THREADED. SEE VALVE SCHEDULE ARTICLES.
E. DISC: BRONZE.
2.4 BRONZE SWING CHECK VALVES
A. CLASS 125, BRONZE, SWING CHECK VALVES WITH BRONZE DISC:
1. DESCRIPTION:
A. STANDARD: MSS SP-80, TYPE 3.
B. CWP RATING: 200 PSIG (1,380 KPA).
C. BODY DESIGN: HORIZONTAL FLOW.
D. BODY MATERIAL: ASTM B 62, BRONZE.
E. ENDS: THREADED OR SOLDERED. SEE VALVE SCHEDULE ARTICLES.
F. DISC: BRONZE.
PART 3 - EXECUTION
3.1 EXAMINATION
A. EXAMINE VALVE INTERIOR FOR CLEANLINESS, FREEDOM FROM FOREIGN MATTER, AND CORROSION. REMOVE SPECIAL PACKING MATERIALS AND BLOCKS USED TO PREVENT DISC MOVEMENT DURING HANDLING.
B. OPERATE VALVES IN POSITIONS FROM FULLY OPEN TO FULLY CLOSED. EXAMINE GUIDES AND SEATS MADE ACCESSIBLE BY SUCH OPERATIONS.
C. EXAMINE THREADS ON VALVE AND MATING PIPE FOR FORM AND CLEANLINESS.
D. DO NOT ATTEMPT TO REPAIR DEFECTIVE VALVES; REPLACE WITH NEW VALVES.
3.2 VALVE INSTALLATION
A. INSTALL VALVES WITH UNIONS OR FLANGES AT EACH PIECE OF EQUIPMENT ARRANGED TO ALLOW SERVICE, MAINTENANCE, AND EQUIPMENT REMOVAL WITHOUT SYSTEM SHUTDOWN.
B. LOCATE VALVES FOR EASY ACCESS AND PROVIDE SEPARATE SUPPORT WHERE NECESSARY.
C. INSTALL VALVES IN HORIZONTAL PIPING WITH STEM AT OR ABOVE CENTER OF PIPE.
D. INSTALL VALVES IN POSITION TO ALLOW FULL STEM MOVEMENT.
E. INSTALL CHECK VALVES FOR PROPER DIRECTION OF FLOW AND AS FOLLOWS:
1. SWING CHECK VALVES: IN HORIZONTAL POSITION WITH HINGE PIN LEVEL.
2. LIFT CHECK VALVES: WITH STEM UPRIGHT AND PLUMB.
F. VALVE TAGS: COMPLY WITH SECTION 220553 "IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT."
3.3 ADJUSTING
A. ADJUST OR REPLACE VALVE PACKING AFTER PIPING SYSTEMS HAVE BEEN TESTED AND PUT INTO SERVICE BUT BEFORE FINAL ADJUSTING AND BALANCING. REPLACE VALVES IF PERSISTENT LEAKING OCCURS.
3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS
A. END CONNECTIONS:
1. FOR COPPER TUBING, NPS 2 (DN 50) AND SMALLER: THREADED OR SOLDERED.
3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE
A. PIPE NPS 2 AND SMALLER: BRONZE SWING CHECK VALVES, CLASS 125 OR CLASS 150, BRONZE DISC WITH SOLDERED OR THREADED END CONNECTIONS.
B. PUMP DISCHARGES: BRONZE LIFT CHECK VALVES, CLASS 125 OR CLASS 150, BRONZE DISC WITH THREADED END CONNECTIONS.
END OF SECTION 220523.14

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
PART 1 - GENERAL
1.1 SUMMARY
A. SECTION INCLUDES:
1. METAL PIPE HANGERS AND SUPPORTS.
2. TRAPEZE PIPE HANGERS.
3. THERMAL-HANGER SHIELD INSERTS.
1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
PART 2 - PRODUCTS
2.1 METAL PIPE HANGERS AND SUPPORTS
A. CARBON-STEEL PIPE HANGERS AND SUPPORTS:
1. DESCRIPTION: MSS SP-58, TYPES 1 THROUGH 58, FACTORY-FABRICATED COMPONENTS.
2. GALVANIZED METALLIC COATINGS: PREGALVANIZED OR HOT DIPPED.
3. NONMETALLIC COATINGS: PLASTIC COATING, JACKET, OR LINER.
4. PADDED HANGERS: HANGER WITH FIBERGLASS OR OTHER PIPE INSULATION PAD OR CUSHION TO SUPPORT BEARING SURFACE OF PIPING.
5. HANGER RODS: CONTINUOUS-THREAD ROD, NUTS, AND WASHER MADE OF CARBON STEEL.
B. COPPER PIPE HANGERS:
1. DESCRIPTION: MSS SP-58, TYPES 1 THROUGH 58, COPPER-COATED OR COPPER-COLORED EPOXY-FINISHED-STEEL, FACTORY-FABRICATED COMPONENTS.
2. HANGER RODS: CONTINUOUS-THREAD ROD, NUTS, AND WASHER MADE OF COPPER-COATED STEEL.
3. COPPER-PLATED HANGERS AND CLAMPS ARE PLATED FOR IDENTIFICATION ONLY. TRADITIONAL THIN COPPER PLATING ON STEEL SUBSTRATE DOES NOT PROVIDE ADEQUATE PROTECTION FROM GALVANIC CORROSION DUE TO CONTACT BETWEEN DISSIMILAR METALS. COPPER COLOR OF PLATING OR PAINT IS PRIMARILY FOR IDENTIFICATION OF HANGERS SIZED FOR COPPER TUBING.
A. WHERE COPPER-PLATED SUPPORTS ARE USED WITH COPPER PIPING, PROVIDE ADDITIONAL PROTECTION BETWEEN DISSIMILAR METALS, SUCH AS THICK PLASTIC OR VINYL FACTORY COATING, FELT LINER, OR PLASTIC-LINED CUSHION CLAMPS.
B. EPOXY COATINGS: A COPPER-COLORED HEAVY-DUTY EPOXY FINISH SUCH AS COOPER B-LINE'S DURA-COPPER OR TOLCO COPPER-TEC IS ACCEPTABLE PROTECTION BETWEEN DISSIMILAR METALS IN NORMALLY DRY LOCATIONS. IN POTENTIALLY DAMP OR WET LOCATIONS AND LOCATIONS EXPOSED TO WEATHER, PROVIDE ADDITIONAL PROTECTION BETWEEN DISSIMILAR METALS, SUCH AS THICK PLASTIC OR VINYL FACTORY COATING, OR PLASTIC-LINED CUSHION CLAMPS.
2.2 TRAPEZE PIPE HANGERS
A. DESCRIPTION: MSS SP-69, TYPE 59, SHOP- OR FIELD-FABRICATED PIPE-SUPPORT ASSEMBLY MADE FROM STRUCTURAL CARBON-STEEL SHAPES WITH MSS SP-58 CARBON-STEEL HANGER RODS, NUTS, SADDLES, AND U-BOLTS.
2.3 THERMAL-HANGER SHIELD INSERTS
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. CARPENTER & PATERSON, INC.
2. ERICO INTERNATIONAL CORPORATION.
3. NATIONAL PIPE HANGER CORPORATION.
4. PHS INDUSTRIES, INC.
5. PIPE SHIELDS, INC.; A SUBSIDIARY OF PIPING TECHNOLOGY & PRODUCTS, INC.
6. PIPING TECHNOLOGY & PRODUCTS, INC.
7. RILCO MANUFACTURING CO., INC.
B. INSULATION-INSERT MATERIAL FOR COLD PIPING: ASTM C591, TYPE VI, GRADE 1 POLYISOCYANURATE WITH 125-PSIG MINIMUM COMPRESSIVE STRENGTH AND VAPOR BARRIER.
C. INSULATION-INSERT MATERIAL FOR HOT PIPING: ASTM C591, TYPE VI, GRADE 1 POLYISOCYANURATE WITH 125-PSIG MINIMUM COMPRESSIVE STRENGTH.
D. FOR TRAPEZE OR CLAMPED SYSTEMS: INSERT AND SHIELD SHALL COVER ENTIRE CIRCUMFERENCE OF PIPE.
E. FOR CLEVIS OR BAND HANGERS: INSERT AND SHIELD SHALL COVER LOWER 180 DEGREES OF PIPE.
F. INSERT LENGTH: EXTEND 2 INCHES BEYOND SHEET METAL SHIELD FOR PIPING OPERATING BELOW AMBIENT AIR TEMPERATURE.
2.4 FASTENER SYSTEMS
A. ANCHORS IN WOOD FRAMING: FULLY-THREADED SCREW ANCHORS FOR WOOD, CASE-HARDENED ZINC PLATED STEEL, SPECIFICALLY DESIGNED FOR VERTICAL OR HORIZONTAL APPLICATIONS, WITH INTEGRAL THREADED-ROD COUPLINGS WHERE APPLICABLE.
PART 3 - EXECUTION
3.1 HANGER AND SUPPORT INSTALLATION
A. METAL PIPE-HANGER INSTALLATION: COMPLY WITH MSS SP-69 AND MSS SP-89. INSTALL HANGERS, SUPPORTS, CLAMPS, AND ATTACHMENTS AS REQUIRED TO PROPERLY SUPPORT PIPING FROM THE BUILDING STRUCTURE.
B. METAL TRAPEZE PIPE-HANGER INSTALLATION: COMPLY WITH MSS SP-69 AND MSS SP-89. ARRANGE FOR GROUPING OF PARALLEL RUNS OF HORIZONTAL PIPING, AND SUPPORT TOGETHER ON FIELD-FABRICATED TRAPEZE PIPE HANGERS.
1. PIPES OF VARIOUS SIZES: SUPPORT TOGETHER AND SPACE TRAPEZES FOR SMALLEST PIPE SIZE OR INSTALL INTERMEDIATE SUPPORTS FOR SMALLER DIAMETER PIPES AS SPECIFIED FOR INDIVIDUAL PIPE HANGERS.
2. FIELD FABRICATE FROM ASTM A36/A36M, CARBON-STEEL SHAPES SELECTED FOR LOADS BEING SUPPORTED. WELD STEEL ACCORDING TO AWS D1.1/D1.1M.
C. THERMAL-HANGER SHIELD INSTALLATION: INSTALL IN PIPE HANGER OR SHIELD FOR INSULATED PIPING.
D. FASTENER SYSTEM INSTALLATION:
1. INSTALL WOOD FRAMING ANCHORS, PRE-DRILLING THE WOOD AT THE SIZE LISTED IN THE ANCHOR MANUFACTURER'S LITERATURE TO PREVENT DAMAGE TO THE WOOD.
E. INSTALL HANGERS AND SUPPORTS COMPLETE WITH NECESSARY ATTACHMENTS, INSERTS, BOLTS, RODS, NUTS, WASHERS, AND OTHER ACCESSORIES.
F. EQUIPMENT SUPPORT INSTALLATION: FABRICATE FROM WELDED-STRUCTURAL-STEEL SHAPES.
G. INSTALL HANGERS AND SUPPORTS TO ALLOW CONTROLLED THERMAL AND SEISMIC MOVEMENT OF PIPING SYSTEMS, TO PERMIT FREEDOM OF MOVEMENT BETWEEN PIPE ANCHORS, AND TO FACILITATE ACTION OF EXPANSION JOINTS, EXPANSION LOOPS, EXPANSION BENDS, AND SIMILAR UNITS.
H. INSTALL LATERAL BRACING WITH PIPE HANGERS AND SUPPORTS TO PREVENT SWAYING.
I. PIPE SLOPES: INSTALL HANGERS AND SUPPORTS TO PROVIDE INDICATED PIPE SLOPES AND TO NOT EXCEED MAXIMUM PIPE DEFLECTIONS ALLOWED BY ASME B31.9 FOR BUILDING SERVICES PIPING.
J. INSULATED PIPING:
1. ATTACH CLAMPS AND SPACERS TO PIPING:
A. PIPING OPERATING ABOVE AMBIENT AIR TEMPERATURE: CLAMP MAY PROJECT THROUGH INSULATION.
B. PIPING OPERATING BELOW AMBIENT AIR TEMPERATURE: USE THERMAL-HANGER SHIELD INSERT WITH CLAMP SIZED TO MATCH OD OF INSERT.
C. DO NOT EXCEED PIPE STRESS LIMITS ALLOWED BY ASME B31.9 FOR BUILDING SERVICES PIPING.
2. INSTALL MSS SP-58, TYPE 39, PROTECTION SADDLES IF INSULATION WITHOUT VAPOR BARRIER IS INDICATED. FILL INTERIOR VOIDS WITH INSULATION THAT MATCHES ADJOINING INSULATION.
3. INSTALL MSS SP-58, TYPE 40, PROTECTIVE SHIELDS ON COLD PIPING WITH VAPOR BARRIER. SHIELDS SHALL SPAN AN ARC OF 180 DEGREES.
4. SHIELD DIMENSIONS FOR PIPE: NOT LESS THAN THE FOLLOWING:
A. NPS 1/4 TO NPS 3-1/2 12 INCHES LONG AND 0.048 INCH THICK.
5. THERMAL-HANGER SHIELDS: INSTALL WITH INSULATION SAME THICKNESS AS PIPING INSULATION.
3.2 EQUIPMENT SUPPORTS
A. FABRICATE STRUCTURAL-STEEL STANDS TO SUSPEND EQUIPMENT FROM STRUCTURE OVERHEAD OR TO SUPPORT EQUIPMENT ABOVE FLOOR.
B. GROUTING: PLACE GROUT UNDER SUPPORTS FOR EQUIPMENT AND MAKE BEARING SURFACE SMOOTH.
C. PROVIDE LATERAL BRACING, TO PREVENT SWAYING, FOR EQUIPMENT SUPPORTS.
3.3 METAL FABRICATIONS
A. CUT, DRILL, AND FIT MISCELLANEOUS METAL FABRICATIONS FOR TRAPEZE PIPE HANGERS AND EQUIPMENT SUPPORTS.
B. FIT EXPOSED CONNECTIONS TOGETHER TO FORM HAIRLINE JOINTS. FIELD WELD CONNECTIONS THAT CANNOT BE SHOP WELDED BECAUSE OF SHIPPING SIZE LIMITATIONS.
C. FIELD WELDING: COMPLY WITH AWS D1.1/D1.1M PROCEDURES FOR SHIELDED, METAL ARC WELDING; APPEARANCE AND QUALITY OF WELDS; AND METHODS USED IN CORRECTING WELDING WORK; AND WITH THE FOLLOWING:
1. USE MATERIALS AND METHODS THAT MINIMIZE DISTORTION AND DEVELOP STRENGTH AND CORROSION RESISTANCE OF BASE METALS.
2. OBTAIN FUSION WITHOUT UNDERCUT OR OVERLAP.
3. REMOVE WELDING FLUX IMMEDIATELY.
4. FINISH WELDS AT EXPOSED CONNECTIONS SO NO ROUGHNESS SHOWS AFTER FINISHING AND SO CONTOURS OF WELDED SURFACES MATCH ADJACENT CONTOURS.
3.4 WOOD FABRICATIONS
A. PROVIDE INTERMEDIATE WOOD SUPPORTS AND BLOCKING BETWEEN WOOD BUILDING FRAMING MEMBERS. SIZE, SUPPORT AND FASTEN FOR THE INTENDED STATIC AND DYNAMIC LOADS AND EXPANSION AND CONTRACTION FORCES.
B. WHERE THE BUILDING STRUCTURAL FRAMING IS METAL, USE METAL FABRICATIONS.
3.5 ADJUSTING
A. HANGER ADJUSTMENTS: ADJUST HANGERS TO DISTRIBUTE LOADS EQUALLY ON ATTACHMENTS AND TO ACHIEVE INDICATED SLOPE OF PIPE.
B. TRIM EXCESS LENGTH OF CONTINUOUS-THREAD HANGER AND SUPPORT RODS TO 1 INCH (25 MM).
3.6 PAINTING
A. TOUCHUP: CLEAN FIELD WELDS AND ABRADED AREAS OF SHOP PAINT. PAINT EXPOSED AREAS IMMEDIATELY AFTER ERECTING HANGERS AND SUPPORTS. USE SAME MATERIALS AS USED FOR SHOP PAINTING. COMPLY WITH SSPC-PA 1 REQUIREMENTS FOR TOUCHING UP FIELD-PAINTED SURFACES.
1. APPLY PAINT BY BRUSH OR SPRAY TO PROVIDE A MINIMUM DRY FILM THICKNESS OF 2.0 MILS.
B. TOUCHUP: CLEANING AND TOUCHUP PAINTING OF FIELD WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS OF SHOP PAINT ON MISCELLANEOUS METAL ARE SPECIFIED IN DIVISION 09 PAINTING SECTIONS
C. GALVANIZED SURFACES: CLEAN WELDS, BOLTED CONNECTIONS, AND ABRADED AREAS AND APPLY GALVANIZING-REPAIR PAINT TO COMPLY WITH ASTM A 780.
3.7 HANGER AND SUPPORT SCHEDULE
A. SPECIFIC HANGER AND SUPPORT REQUIREMENTS ARE IN SECTIONS SPECIFYING PIPING SYSTEMS AND EQUIPMENT.
B. COMPLY WITH MSS SP-69 FOR PIPE-HANGER SELECTIONS AND APPLICATIONS THAT ARE NOT SPECIFIED IN PIPING SYSTEM SECTIONS.
C. USE HANGERS AND SUPPORTS WITH GALVANIZED METALLIC COATINGS FOR PIPING AND EQUIPMENT THAT WILL NOT HAVE FIELD-APPLIED FINISH.
D. USE NONMETALLIC COATINGS ON ATTACHMENTS FOR ELECTROLYTIC PROTECTION WHERE ATTACHMENTS ARE IN DIRECT CONTACT WITH COPPER TUBING.
E. USE CARBON-STEEL SUPPORTS AND ATTACHMENTS FOR GENERAL SERVICE APPLICATIONS.
F. USE STAINLESS-STEEL PIPE HANGERS AND STAINLESS-STEEL CORROSION-RESISTANT ATTACHMENTS FOR HOSTILE ENVIRONMENT APPLICATIONS, AND FOR MOIST AREAS SUCH AS LOCKER ROOMS.
G. USE COPPER-PLATED PIPE HANGERS AND COPPER OR STAINLESS-STEEL ATTACHMENTS FOR COPPER PIPING AND TUBING. COPPER PLATING OR COPPER-COLORED PAINT IS FOR IDENTIFICATION PURPOSES ONLY; PROVIDE ADDITIONAL PROTECTION FROM DISSIMILAR METALS.
H. USE PADDED HANGERS FOR PIPING THAT IS SUBJECT TO SCRATCHING.
I. USE THERMAL-HANGER SHIELD INSERTS FOR INSULATED PIPING AND TUBING.
J. HORIZONTAL-PIPING HANGERS AND SUPPORTS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SECTIONS, INSTALL THE FOLLOWING TYPES:
1. ADJUSTABLE, STEEL CLEVIS HANGERS (MSS TYPE 1): FOR SUSPENSION OF NONINSULATED OR INSULATED, STATIONARY PIPES NPS 1/2 TO NPS 30 (DN 15 TO DN 750).
2. CARBON OR ALLOY-STEEL, DOUBLE-BOLT PIPE CLAMPS (MSS TYPE 3): FOR SUSPENSION OF PIPES NPS 3/4 TO NPS 36 (DN 20 TO DN 900), REQUIRING CLAMP FLEXIBILITY AND UP TO 4 INCHES (100 MM) OF INSULATION.
3. STEEL PIPE CLAMPS (MSS TYPE 4): FOR SUSPENSION OF COLD AND HOT PIPES NPS 1/2 TO NPS 24 (DN 15 TO DN 600) IF LITTLE OR NO INSULATION IS REQUIRED.
4. PIPE HANGERS (MSS TYPE 5): FOR SUSPENSION OF PIPES NPS 1/2 TO NPS 4 (DN 15 TO DN 100), TO ALLOW OFF-CENTER CLOSURE FOR HANGER INSTALLATION BEFORE PIPE ERECTION.
5. ADJUSTABLE, SWIVEL SPLIT OR SOLID-RING HANGERS (MSS TYPE 6): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 3/4 TO NPS 8 (DN 20 TO DN 200).
6. ADJUSTABLE, STEEL BAND HANGERS (MSS TYPE 7): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 1/2 TO NPS 8 (DN 15 TO DN 200).
7. ADJUSTABLE BAND HANGERS (MSS TYPE 9): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 1/2 TO NPS 8 (DN 15 TO DN 200).
8. ADJUSTABLE, SWIVEL-RING BAND HANGERS (MSS TYPE 10): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 1/2 TO NPS 8 (DN 15 TO DN 200).
9. SPLIT PIPE RING WITH OR WITHOUT TURNBUCKLE HANGERS (MSS TYPE 11): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 3/8 TO NPS 8 (DN 10 TO DN 200).
10. EXTENSION HINGED OR TWO-BOLT SPLIT PIPE CLAMPS (MSS TYPE 12): FOR SUSPENSION OF NONINSULATED, STATIONARY PIPES NPS 3/8 TO NPS 3 (DN 10 TO DN 80).
11. U-BOLTS (MSS TYPE 24): FOR SUPPORT OF HEAVY PIPES NPS 1/2 TO NPS 30 (DN 15 TO DN 750).
12. CLIPS (MSS TYPE 26): FOR SUPPORT OF INSULATED PIPES NOT SUBJECT TO EXPANSION OR CONTRACTION.
K. VERTICAL-PIPING CLAMPS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SECTIONS, INSTALL THE FOLLOWING TYPES:
1. EXTENSION PIPE OR RISER CLAMPS (MSS TYPE 8): FOR SUPPORT OF PIPE RISERS NPS 3/4 TO NPS 24 (DN 24 TO DN 600).
2. CARBON- OR ALLOY-STEEL RISER CLAMPS (MSS TYPE 42): FOR SUPPORT OF PIPE RISERS NPS 3/4 TO NPS 24 (DN 20 TO DN 600) IF LONGER ENDS ARE REQUIRED FOR RISER CLAMPS.
L. HANGER-ROD ATTACHMENTS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SECTIONS, INSTALL THE FOLLOWING TYPES:
1. STEEL TURNBUCKLES (MSS TYPE 13): FOR ADJUSTMENT UP TO 6 INCHES (150 MM) FOR HEAVY LOADS.
2. STEEL CLEVISES (MSS TYPE 14): FOR 120 TO 450 DEG F (49 TO 232 DEG C) PIPING INSTALLATIONS.
3. SWIVEL TURNBUCKLES (MSS TYPE 15): FOR USE WITH MSS TYPE 11, SPLIT PIPE RINGS.
4. MALLEABLE-IRON SOCKETS (MSS TYPE 16): FOR ATTACHING HANGER RODS TO VARIOUS TYPES OF BUILDING ATTACHMENTS.
M. BUILDING ATTACHMENTS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SECTIONS, INSTALL THE FOLLOWING TYPES:
1. SIDE-BEAM BRACKETS (MSS TYPE 34): FOR SIDES OF STEEL OR WOODEN BEAMS.
N. SADDLES AND SHIELDS: UNLESS OTHERWISE INDICATED AND EXCEPT AS SPECIFIED IN PIPING SYSTEM SECTIONS, INSTALL THE FOLLOWING TYPES:
1. STEEL-PIPE-COVERING PROTECTION SADDLES (MSS TYPE 39): TO FILL INTERIOR VOIDS WITH INSULATION THAT MATCHES ADJOINING INSULATION.
2. PROTECTION SHIELDS (MSS TYPE 40): OF LENGTH RECOMMENDED IN WRITING BY MANUFACTURER TO PREVENT CRUSHING INSULATION.
3. THERMAL-HANGER SHIELD INSERTS: FOR SUPPORTING INSULATED PIPE.
END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
PART 1 - GENERAL
1.1 SUMMARY
A. SECTION INCLUDES:
1. EQUIPMENT LABELS.
2. WARNING SIGNS AND LABELS.
3. PIPE LABELS.
4. VALVE TAGS.
5. WARNING TAGS.
1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
PART 2 - PRODUCTS
2.1 EQUIPMENT LABELS
A. METAL LABELS FOR EQUIPMENT:
1. MATERIAL AND THICKNESS: BRASS, 0.032-INCH, AND HAVING PREDRILLED OR STAMPED HOLES FOR ATTACHMENT HARDWARE.
2. MINIMUM LABEL SIZE: LENGTH AND WIDTH VARY FOR REQUIRED LABEL CONTENT, BUT NOT LESS THAN 2-1/2 BY 3/4-INCH.
3. MINIMUM LETTER SIZE: 1/4INCH FOR NAME OF UNITS IF VIEWING DISTANCE IS LESS THAN 24 INCHES, 1/2-INCH FOR VIEWING DISTANCES UP TO 72 INCHES, AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-FOURTHS THE SIZE OF PRINCIPAL LETTERING.
4. FASTENERS: STAINLESS-STEEL RIVETS OR SELF-TAPPING SCREWS.
5. ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.
B. PLASTIC LABELS FOR EQUIPMENT:
1. MATERIAL AND THICKNESS: MULTILAYER, MULTICOLOR, PLASTIC LABELS FOR MECHANICAL ENGRAVING, 1/16-INCH THICK, AND HAVING PREDRILLED HOLES FOR ATTACHMENT HARDWARE.
2. LETTER COLOR: BLACK.
3. BACKGROUND COLOR: WHITE.
4. MAXIMUM TEMPERATURE: ABLE TO WITHSTAND TEMPERATURES UP TO 160 DEG F
5. FASTENERS: STAINLESS-STEEL RIVETS.
6. ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.
C. LABEL CONTENT: INCLUDE EQUIPMENT'S DRAWING DESIGNATION OR UNIQUE EQUIPMENT NUMBER, DRAWING NUMBERS WHERE EQUIPMENT IS INDICATED (PLANS, DETAILS, AND SCHEDULES), PLUS THE SPECIFICATION SECTION NUMBER AND TITLE WHERE EQUIPMENT IS SPECIFIED.
D. EQUIPMENT LABEL SCHEDULE: FOR EACH ITEM OF EQUIPMENT TO BE LABELED, ON 8-1/2- BY-11-INCH (A4) BOND PAPER. TABULATE EQUIPMENT IDENTIFICATION NUMBER AND IDENTIFY DRAWING NUMBERS WHERE EQUIPMENT IS INDICATED (PLANS, DETAILS, AND SCHEDULES), PLUS THE SPECIFICATION SECTION NUMBER AND TITLE WHERE EQUIPMENT IS SPECIFIED. INCLUDE EQUIPMENT SCHEDULE IN OPERATION AND MAINTENANCE DATA.
2.2 WARNING SIGNS AND LABELS
A. MATERIAL AND THICKNESS: MULTILAYER, MULTICOLOR, PLASTIC LABELS FOR MECHANICAL ENGRAVING, 1/16-INCH THICK, AND HAVING PREDRILLED HOLES FOR ATTACHMENT HARDWARE.
B. LETTER COLOR: WHITE.
C. BACKGROUND COLOR: RED.
D. MAXIMUM TEMPERATURE: ABLE TO WITHSTAND TEMPERATURES UP TO 160 DEG F.
E. FASTENERS: STAINLESS-STEEL RIVETS OR SELF-TAPPING SCREWS.
F. ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.
G. LABEL CONTENT: INCLUDE CAUTION AND WARNING INFORMATION, PLUS EMERGENCY NOTIFICATION INSTRUCTIONS.
2.3 PIPE LABELS
A. GENERAL REQUIREMENTS FOR MANUFACTURED PIPE LABELS: PREPRINTED, COLOR-CODED, WITH LETTERING INDICATING SERVICE, AND SHOWING FLOW DIRECTION.
B. PRETENSIONED PIPE LABELS: PRECOILED, SEMIRIGID PLASTIC FORMED TO COVER FULL CIRCUMFERENCE OF PIPE AND TO ATTACH TO PIPE WITHOUT FASTENERS OR ADHESIVE.
C. SELF-ADHESIVE PIPE LABELS: PRINTED PLASTIC WITH CONTACT-TYPE, PERMANENT-ADHESIVE BACKING.
D. PIPE LABEL CONTENTS: INCLUDE IDENTIFICATION OF PIPING SERVICE USING SAME DESIGNATIONS OR ABBREVIATIONS AS USED ON DRAWINGS, PIPE SIZE, AND AN ARROW INDICATING FLOW DIRECTION.
1. FLOW-DIRECTION ARROWS: INTEGRAL WITH PIPING SYSTEM SERVICE LETTERING TO ACCOMMODATE BOTH DIRECTIONS OR AS SEPARATE UNIT ON EACH PIPE LABEL TO INDICATE FLOW DIRECTION.
2. LETTERING SIZE: AT LEAST 1-1/2 INCHES HIGH.
2.4 VALVE TAGS
A. VALVE TAGS: STAMPED OR ENGRAVED WITH 1/4-INCH LETTERS FOR PIPING SYSTEM ABBREVIATION AND 1/2-INCH NUMBERS.
1. TAG MATERIAL: BRASS, 0.032-INCH MINIMUM THICKNESS, AND HAVING PREDRILLED OR STAMPED HOLES FOR ATTACHMENT HARDWARE.
2. FASTENERS: BRASS WIRE-LINK OR BEADED CHAIN; OR S-HOOK.
B. VALVE SCHEDULES: FOR EACH PIPING SYSTEM, ON 8-1/2-BY-11-INCH (A4) BOND PAPER. TABULATE VALVE NUMBER, PIPING SYSTEM, SYSTEM ABBREVIATION (AS SHOWN ON VALVE TAG), LOCATION OF VALVE (ROOM OR SPACE), NORMAL-OPERATING POSITION (OPEN, CLOSED, OR MODULATING), AND VARIATIONS FOR IDENTIFICATION. MARK VALVES FOR EMERGENCY SHUTOFF AND SIMILAR SPECIAL USES.
1. VALVE-TAG SCHEDULE SHALL BE INCLUDED IN OPERATION AND MAINTENANCE DATA.
2.5 WARNING TAGS
A. WARNING TAGS: PREPRINTED OR PARTIALLY PREPRINTED, ACCIDENT-PREVENTION TAGS, OF PLASTICIZED CARD STOCK WITH MATTE FINISH SUITABLE FOR WRITING.
1. SIZE: 3 BY 5-1/4 INCHES (75 BY 133 MM) MINIMUM.
2. FASTENERS: BRASS GROMMET AND WIRE.
3. NOMENCLATURE: LARGE-SIZE PRIMARY CAPTION SUCH AS "DANGER," "CAUTION," OR "DO NOT OPERATE."
4. COLOR: YELLOW BACKGROUND WITH BLACK LETTERING.
PART 3 - EXECUTION
3.1 PREPARATION
A. CLEAN PIPING AND EQUIPMENT SURFACES OF SUBSTANCES THAT COULD IMPAIR BOND OF IDENTIFICATION DEVICES, INCLUDING DIRT, OIL, GREASE, RELEASE AGENTS, AND INCOMPATIBLE PRIMERS, PAINTS, AND ENCAPSULANTS.
3.2 EQUIPMENT LABEL INSTALLATION
A. INSTALL OR PERMANENTLY FASTEN LABELS ON EACH MAJOR ITEM OF MECHANICAL EQUIPMENT.
B. LOCATE EQUIPMENT LABELS WHERE ACCESSIBLE AND VISIBLE.
3.3 PIPE LABEL INSTALLATION
A. STENCILED PIPE LABEL OPTION: STENCILED LABELS MAY BE PROVIDED INSTEAD OF MANUFACTURED PIPE LABELS, AT INSTALLER'S OPTION. INSTALL STENCILED PIPE LABELS WITH PAINTED, COLOR-CODED BANDS OR RECTANGLES, COMPLYING WITH ASME A13.1-2015, ON EACH PIPING SYSTEM.
1. IDENTIFICATION PAINT: USE FOR CONTRASTING BACKGROUND.
2. STENCIL PAINT: USE FOR PIPE MARKING.
B. LOCATE PIPE LABELS WHERE PIPING IS EXPOSED OR ABOVE ACCESSIBLE CEILINGS IN FINISHED SPACES; MACHINE ROOMS; ACCESSIBLE MAINTENANCE SPACES SUCH AS SHAFTS, TUNNELS, AND PLENUMS; AND EXTERIOR EXPOSED LOCATIONS AS FOLLOWS:
1. NEAR EACH VALVE AND CONTROL DEVICE.
2. NEAR EACH BRANCH CONNECTION, EXCLUDING SHORT TAKEOFFS FOR FIXTURES AND TERMINAL UNITS. WHERE FLOW PATTERN IS NOT OBVIOUS, MARK EACH PIPE AT BRANCH.
3. NEAR PENETRATIONS THROUGH WALLS, FLOORS, CEILINGS, AND INACCESSIBLE ENCLOSURES.
4. AT ACCESS DOORS, MANHOLES, AND SIMILAR ACCESS POINTS THAT PERMIT VIEW OF CONCEALED PIPING.
5. NEAR MAJOR EQUIPMENT ITEMS AND OTHER POINTS OF ORIGINATION AND TERMINATION.
6. SPACED AT MAXIMUM INTERVALS OF 50 FEET (15 M) ALONG EACH RUN. REDUCE INTERVALS TO 25 FEET (7.6 M) IN AREAS OF CONGESTED PIPING AND EQUIPMENT.
7. ON PIPING ABOVE REMOVABLE ACOUSTICAL CEILINGS. OMIT INTERMEDIATELY SPACED LABELS.
C. PIPE LABEL COLOR SCHEDULE:
1. DOMESTIC WATER PIPING:
A. BACKGROUND COLOR: BLUE.
B. LETTER COLOR: WHITE.
2. SANITARY WASTE AND STORM DRAINAGE PIPING:
A. BACKGROUND COLOR: WHITE.
B. LETTER COLOR: BLACK.
3.4 VALVE-TAG INSTALLATION
A. INSTALL TAGS ON VALVES AND CONTROL DEVICES IN PIPING SYSTEMS, EXCEPT CHECK VALVES; VALVES WITHIN FACTORY-FABRICATED EQUIPMENT UNITS; SHUTOFF VALVES; FAUCETS; CONVENIENCE AND LAWN-WATERING HOSE CONNECTIONS; AND SIMILAR ROUGHING-IN CONNECTIONS OF END-USE FIXTURES AND UNITS. LIST TAGGED VALVES IN A VALVE SCHEDULE.
B. VALVE-TAG APPLICATION SCHEDULE: TAG VALVES ACCORDING TO SIZE, SHAPE, AND COLOR SCHEME AND WITH CAPTIONS SIMILAR TO THOSE INDICATED IN THE FOLLOWING SUBPARAGRAPHS:
1. VALVE-TAG SIZE AND SHAPE:
A. COLD AND HOT WATER: 1-1/2 INCHES (38 MM), ROUND.
2. NON-POTABLE VALVE-TAG COLOR:
A. COLD AND HOT WATER: BLUE.
3. LETTER COLOR:
A. COLD AND HOT WATER: BLACK.
B. NON-POTABLE WATER: BLACK.
3.5 WARNING-TAG INSTALLATION
A. WRITE REQUIRED MESSAGE ON, AND ATTACH WARNING TAGS TO, EQUIPMENT AND OTHER ITEMS WHERE REQUIRED.
END OF SECTION 220553

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TOWN OF SANBORNTON · GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE · THOMAS W. BETTERIDGE · No. 13988 · LICENSED · PROFESSIONAL ENGINEER · 10/20/2021

REVISIONS

SHEET TITLE:
SPECIFICATIONS

P5.2

SPECIFICATIONS P5.2

1/8" = 1'-0" 3/32" = 1'-0" 1/16" = 1'-0"

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1/8" = 1'-0" 0' 4' 8' 16' 32'

3/32" = 1'-0" 0' 8' 16' 32' 64'

1/16" = 1'-0" 0' 8' 16' 32' 64'

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES INSULATING THE FOLLOWING PLUMBING PIPING SERVICES:

1. DOMESTIC COLD-WATER AND HOT-WATER PIPING.

2. DOMESTIC RECIRCULATING HOT-WATER PIPING.

3. SUPPLIES AND DRAINS FOR HANDICAP-ACCESSIBLE LAVATORIES AND SINKS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

1.3 QUALITY ASSURANCE

A. INSTALLER QUALIFICATIONS: SKILLED MECHANICS WHO HAVE SUCCESSFULLY COMPLETED AN APPRENTICESHIP PROGRAM OR ANOTHER CRAFT TRAINING PROGRAM CERTIFIED BY THE DEPARTMENT OF LABOR, BUREAU OF APPRENTICESHIP AND TRAINING.

B. SURFACE-BURNING CHARACTERISTICS: FOR INSULATION AND RELATED MATERIALS, AS DETERMINED BY TESTING IDENTICAL PRODUCTS ACCORDING TO ASTM E84 BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION. FACTORY LABEL INSULATION AND JACKET MATERIALS AND ADHESIVE, MASTIC, TAPES, AND CEMENT MATERIAL CONTAINERS, WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AGENCY.

1. INSULATION INSTALLED INDOORS: FLAME-SPREAD INDEX OF 25 OR LESS, AND SMOKE-DEVELOPED INDEX OF 50 OR LESS.

2. INSULATION INSTALLED OUTDOORS: FLAME-SPREAD INDEX OF 75 OR LESS, AND SMOKE-DEVELOPED INDEX OF 150 OR LESS.

C. COMPLY WITH THE FOLLOWING APPLICABLE STANDARDS AND OTHER REQUIREMENTS SPECIFIED FOR MISCELLANEOUS COMPONENTS:

1. SUPPLY AND DRAIN PROTECTIVE SHIELDING GUARDS: ICC A117.1.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. COMPLY WITH REQUIREMENTS IN "PIPING INSULATION SCHEDULE, GENERAL," "INDOOR PIPING INSULATION SCHEDULE," AND "EQUIPMENT INSULATION SCHEDULE" ARTICLES FOR WHERE INSULATING MATERIALS SHALL BE APPLIED.

B. PRODUCTS SHALL NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS.

C. PRODUCTS THAT COME IN CONTACT WITH STAINLESS STEEL SHALL HAVE A LEACHABLE CHLORIDE CONTENT OF LESS THAN 50 PPM WHEN TESTED ACCORDING TO ASTM C871.

D. INSULATION MATERIALS FOR USE ON AUSTENITIC STAINLESS STEEL SHALL BE QUALIFIED AS ACCEPTABLE ACCORDING TO ASTM C795.

E. FOAM INSULATION MATERIALS SHALL NOT USE CFC OR HCFC BLOWING AGENTS IN THE MANUFACTURING PROCESS.

F. FLEXIBLE ELASTOMERIC INSULATION: CLOSED-CELL, SPONGE OR EXPANDED-RUBBER MATERIALS. SHEET AND TUBULAR FORM AS APPLICABLE. COMPLY WITH ASTM C534, TYPE I FOR TUBULAR MATERIALS.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. ARMACELL LLC; AP ARMAFLEX OR AP ARMAFLEX FS AS THICKNESS REQUIRES.

B. K-FLEX USA; INSUL-LOCK, INSUL-TUBE, AND INSUL-SHEET.

C. NO SUBSTITUTIONS.

G. MINERAL-FIBER, PREFORMED PIPE INSULATION:

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. JOHNS MANVILLE; MICRO-LOK.

B. KNAUF INSULATION; 1,000-DEGREE PIPE INSULATION.

C. OWENS CORNING; FIBERGLAS PIPE INSULATION.

2. TYPE I, 850 DEG F (454 DEG C) MATERIALS: MINERAL OR GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C547, TYPE I, GRADE A, WITH FACTORY-APPLIED ASJ. FACTORY-APPLIED JACKET REQUIREMENTS ARE SPECIFIED IN "FACTORY-APPLIED JACKETS" ARTICLE.

2.2 INSULATING CEMENTS

A. MINERAL-FIBER, HYDRAULIC-SETTING INSULATING AND FINISHING CEMENT: COMPLY WITH ASTM C449.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

A. RAMCO INSULATION, INC.; SUPER-STIK.

2.3 ADHESIVES

A. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES AND FOR BONDING INSULATION TO ITSELF AND TO SURFACES TO BE INSULATED, UNLESS OTHERWISE INDICATED.

B. PRODUCT ATTRIBUTES IN FIRST PARAGRAPH BELOW ARE BASED ON FOSTER BRAND PRODUCTS; THERE ARE VARIATIONS AMONG MANUFACTURERS.

C. FLEXIBLE ELASTOMERIC ADHESIVE: COMPLY WITH MIL-A-24179A, TYPE II, CLASS I.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. ARMACELL LLC; ARMAFLEX 520 ADHESIVE.

B. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 85-75.

C. K-FLEX USA; R-373 CONTACT ADHESIVE.

D. MINERAL-FIBER ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-127.

B. EAGLE BRIDGES - MARATHON INDUSTRIES; 225.

C. MON-ECO INDUSTRIES, INC.; 22-25.

E. ASJ ADHESIVE, AND FSK JACKET ADHESIVE: COMPLY WITH MIL-A-3316C, CLASS 2, GRADE A FOR BONDING INSULATION JACKET LAP SEAMS AND JOINTS.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-82.

B. EAGLE BRIDGES - MARATHON INDUSTRIES; 225.

C. MON-ECO INDUSTRIES, INC.; 22-25.

F. PVC JACKET ADHESIVE: COMPATIBLE WITH PVC JACKET.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. DOW CORNING CORPORATION; 739, DOW SILICONE.

B. JOHNS MANVILLE; ZESTON PERMA-WELD, CEEL-TITE SOLVENT WELDING ADHESIVE.

2.4 MASTICS

A. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES; COMPLY WITH MIL-PRF-19565C, TYPE II.

B. VAPOR-BARRIER MASTIC: WATER BASED; SUITABLE FOR INDOOR USE ON BELOW-AMBIENT SERVICES.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 30-80/30-90.

B. VIMASCO CORPORATION; 749.

2. WATER-VAPOR PERMEANCE: ASTM E96/E96M, PROCEDURE B, 0.013 PERM AT 43-MIL DRY FILM THICKNESS.

3. SERVICE TEMPERATURE RANGE: MINUS 20 TO PLUS 180° F.

4. SOLIDS CONTENT: ASTM D1644, 58 PERCENT BY VOLUME AND 70 PERCENT BY WEIGHT.

5. COLOR: WHITE.

C. VAPOR-BARRIER MASTIC: SOLVENT BASED; SUITABLE FOR INDOOR USE ON BELOW-AMBIENT SERVICES.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-30.

B. EAGLE BRIDGES - MARATHON INDUSTRIES; 501.

C. MON-ECO INDUSTRIES, INC.; 55-10.

2. WATER-VAPOR PERMEANCE: ASTM F1249, 0.05 PERM AT 35-MIL DRY FILM THICKNESS.

3. SERVICE TEMPERATURE RANGE: 0 TO 180° F.

4. SOLIDS CONTENT: ASTM D1644, 44 PERCENT BY VOLUME AND 62 PERCENT BY WEIGHT.

5. COLOR: WHITE.

D. VAPOR-BARRIER MASTIC: SOLVENT BASED; SUITABLE FOR OUTDOOR USE ON BELOW-AMBIENT SERVICES.

1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; ENCACEL.

B. EAGLE BRIDGES - MARATHON INDUSTRIES; 570.

C. FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 60-95/60-96.

2. WATER-VAPOR PERMEANCE: ASTM F1249, 0.05 PERM AT 30-MIL DRY FILM THICKNESS.

3. SERVICE TEMPERATURE RANGE: MINUS 50 TO PLUS 220 DEG F

4. SOLIDS CONTENT: ASTM D1644, 33 PERCENT BY VOLUME AND 46 PERCENT BY WEIGHT.

5. COLOR: WHITE.

2.5 LAGGING ADHESIVES

A. DESCRIPTION: COMPLY WITH MIL-A-3316C, CLASS I, GRADE A, AND SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1909&MF=04 &SRC=WD"PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822525&MF=04 &SRC=WD"CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-50 AHV2.

B. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822526&MF=04 &SRC=WD"FOSTER BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; 30-36.

C. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822528&MF=04 &SRC=WD"VIMASCO CORPORATION; 713 AND 714.

2. FIRE-RESISTANT, WATER-BASED LAGGING ADHESIVE AND COATING FOR USE INDOORS TO ADHERE FIRE-RESISTANT LAGGING CLOTHS OVER PIPE INSULATION.

3. SERVICE TEMPERATURE RANGE: 0 TO PLUS 180° F.

4. COLOR: WHITE.

2.6 SEALANTS

A. ASJ FLASHING SEALANTS, AND PVC JACKET FLASHING SEALANTS:

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1912&MF=04 &SRC=WD"PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822548&MF=04 &SRC=WD"CHILDERS BRAND, SPECIALTY CONSTRUCTION BRANDS, INC., A BUSINESS OF H. B. FULLER COMPANY; CP-76.

2. MATERIALS SHALL BE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.

3. FIRE- AND WATER-RESISTANT, FLEXIBLE, ELASTOMERIC SEALANT.

4. SERVICE TEMPERATURE RANGE: MINUS 40 TO PLUS 250° F.

5. COLOR: WHITE.

2.7 FACTORY-APPLIED JACKETS

A. INSULATION SYSTEM SCHEDULES INDICATE FACTORY-APPLIED JACKETS ON VARIOUS APPLICATIONS. WHEN FACTORY-APPLIED JACKETS ARE INDICATED, COMPLY WITH THE FOLLOWING:

1. ASJ: WHITE, KRAFT-PAPER, FIBERGLASS-REINFORCED SCRIM WITH ALUMINUM-FOIL BACKING; COMPLYING WITH ASTM C1136, TYPE I.

2.8 FIELD-APPLIED JACKETS

A. FIELD-APPLIED JACKETS SHALL COMPLY WITH ASTM C921, TYPE I, UNLESS OTHERWISE INDICATED.

B. PVC JACKET: HIGH-IMPACT-RESISTANT, UV-RESISTANT PVC COMPLYING WITH ASTM D1784, CLASS 16354-C; THICKNESS AS SCHEDULED; ROLL STOCK READY FOR SHOP OR FIELD CUTTING AND FORMING. THICKNESS IS INDICATED IN FIELD-APPLIED JACKET SCHEDULES.

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1916&MF=04 &SRC=WD"PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822558&MF=04 &SRC=WD"JOHNS MANVILLE; ZESTON.

B. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822562&MF=04 &SRC=WD"PROTO CORPORATION; LOSMOKE.

2. ADHESIVE: AS RECOMMENDED BY JACKET MATERIAL MANUFACTURER.

3. COLOR: WHITE.

4. FACTORY-FABRICATED FITTING COVERS TO MATCH JACKET IF AVAILABLE; OTHERWISE, FIELD FABRICATE.

A. SHAPES: 45 AND 90-DEGREE, SHORT- AND LONG-RADIUS ELBOWS, TEES, VALVES, FLANGES, UNIONS, REDUCERS, END CAPS, SOIL-PIPE HUBS, TRAPS, MECHANICAL JOINTS, AND P-TRAP AND SUPPLY COVERS FOR LAVATORIES.

2.9 TAPES

A. ASJ TAPE: WHITE VAPOR-RETARDER TAPE MATCHING FACTORY-APPLIED JACKET WITH ACRYLIC ADHESIVE, COMPLYING WITH ASTM C1136.

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1920&MF=04 &SRC=WD"PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822576&MF=04 &SRC=WD"ABI, IDEAL TAPE DIVISION; 428 AWF ASJ.

B. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822577&MF=04 &SRC=WD"AVERY DENNISON CORPORATION, SPECIALTY TAPES DIVISION; FASSON 0836.

C. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822579&MF=04 &SRC=WD"COMPAC CORPORATION; 104 AND 105.

D. NASHUA.

E. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822580&MF=04 &SRC=WD"VENTURE TAPE; 1540 CW PLUS, 1542 CW PLUS, AND 1542 CW PLUS/SQ.

2. WIDTH: 3 INCHES (75 MM).

3. THICKNESS: 11.5 MILS (0.29 MM).

4. ADHESION: 90 OUNCES FORCE/INCH (1.0 N/MM) IN WIDTH.

5. ELONGATION: 2 PERCENT.

6. TENSILE STRENGTH: 40 LBF PER INCH (7.2 N/MM) IN WIDTH.

7. ASJ TAPE DISKS AND SQUARES: PRECUT DISKS OR SQUARES OF ASJ TAPE.

B. PVC TAPE: WHITE VAPOR-RETARDER TAPE MATCHING FIELD-APPLIED PVC JACKET WITH ACRYLIC ADHESIVE; SUITABLE FOR INDOOR AND OUTDOOR APPLICATIONS.

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1922&MF=04 &SRC=WD"PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822589&MF=04 &SRC=WD"ABI, IDEAL TAPE DIVISION; 370 WHITE PVC TAPE.

B. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822590&MF=04 &SRC=WD"COMPAC CORPORATION; 130.

C. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822592&MF=04 &SRC=WD"VENTURE TAPE; 1506 CW NS.

2. WIDTH: 2 INCHES (50 MM).

3. THICKNESS: 6 MILS (0.15 MM).

4. ADHESION: 64 OUNCES FORCE/INCH (0.7 N/MM) IN WIDTH.

5. ELONGATION: 500 PERCENT.

6. TENSILE STRENGTH: 18 LBF PER INCH (3.3 N/MM) IN WIDTH.

2.10 SECUREMENTS

A. BANDS:

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1925&MF=04 &SRC=WD"PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822604&MF=04 &SRC=WD"ITW INSULATION SYSTEMS; GERRARD STRAPPING AND SEALS.

B. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822605&MF=04 &SRC=WD"RPR PRODUCTS, INC.; INSUL-MATE STRAPPING AND SEALS.

2. STAINLESS STEEL: ASTM A167 OR ASTM A240/A240M, TYPE 304; 0.015-INCH (0.38 MM) THICK, 1/2INCH (13 MM) WIDE WITH WING SEAL OR CLOSED SEAL.

3. ALUMINUM: ASTM B209 (ASTM B209M), ALLOY 3003, 3005, 3105, OR 5005; TEMPER H-14, 0.020-INCH (0.51 MM) THICK, 1/2INCH (13 MM) WIDE WITH WING SEAL OR CLOSED SEAL.

B. STAPLES: OUTWARD-CLINCHING INSULATION STAPLES, NOMINAL 3/4-INCH - (19-MM-) WIDE, STAINLESS STEEL OR MONEL.

C. WIRE: 0.062-INCH (1.6-MM) SOFT-ANNEALED, STAINLESS STEEL.

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1926&MF=04 &SRC=WD"MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456808557&MF=04 &SRC=WD"C & F WIRE.

2.11 PROTECTIVE SHIELDING GUARDS

A. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?ULID=1927&MF=04&SRC=WD"MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

1. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456808558&MF=04 &SRC=WD"ENGINEERED BRASS COMPANY.

2. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822610&MF=04&SRC=WD"INSUL-TECT PRODUCTS CO.; A SUBSIDIARY OF MVG MOLDED PRODUCTS.

3. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456808559&MF=04 &SRC=WD"MCGUIRE MANUFACTURING.

4. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456808560&MF=04 &SRC=WD"PLUMBEREX.

5. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822613&MF=04 &SRC=WD"TRUEBRO; A BRAND OF IPS CORPORATION.

6. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456822614&MF=04&SRC=WD"ZURN INDUSTRIES, LLC; TUBULAR BRASS PLUMBING PRODUCTS OPERATION.

B. PROTECTIVE SHIELDING PIPE COVERS:

1. DESCRIPTION: MANUFACTURED PLASTIC WRAPS FOR COVERING PLUMBING FIXTURE HOT- AND COLD-WATER SUPPLIES AND TRAP AND DRAIN PIPING. COMPLY WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.

C. PROTECTIVE LAVATORY SHIELDS:

1. DESCRIPTION: MANUFACTURED TOTAL ENCLOSURE FOR COVERING UNDERSIDE OF LAVATORIES AND THEIR HOT-AND-COLD-WATER SUPPLIES AND TRAP AND DRAIN PIPING. ONE-PIECE CONSTRUCTION OF RIGID HIGH-IMPACT STAIN-RESISTANT PAINTABLE WHITE PVC WITH A FINE HAIRCELL FINISH, 0.093-INCH (2.3 MM) THICKNESS. UL LISTED PER ADA ARTICLE 4.19.4.22FF. STAINLESS STEEL REUSABLE SCREW FASTENERS FOR MOUNTING TO WALL. COMPLY WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS. PROVIDE FACTORY PRE-CUT TO CLOSELY FIT THE UNDERSIDE OF THE INSTALLED MODEL OF LAVATORY.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. INSTALL INSULATION MATERIALS, ACCESSORIES, AND FINISHES WITH SMOOTH, STRAIGHT, AND EVEN SURFACES; FREE OF VOIDS THROUGHOUT THE LENGTH OF PIPING INCLUDING FITTINGS, VALVES, AND SPECIALTIES.

B. INSTALL INSULATION MATERIALS, FORMS, VAPOR BARRIERS OR RETARDERS, JACKETS, AND THICKNESSES REQUIRED FOR EACH ITEM OF PIPE SYSTEM AS SPECIFIED IN INSULATION SYSTEM SCHEDULES.

C. INSTALL ACCESSORIES COMPATIBLE WITH INSULATION MATERIALS AND SUITABLE FOR THE SERVICE. INSTALL ACCESSORIES THAT DO NOT CORRODE, SOFTEN, OR OTHERWISE ATTACK INSULATION OR JACKET IN EITHER WET OR DRY STATE.

D. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT TOP AND BOTTOM OF HORIZONTAL RUNS.

E. INSTALL MULTIPLE LAYERS OF INSULATION WITH LONGITUDINAL AND END SEAMS STAGGERED.

F. DO NOT WELD BRACKETS, CLIPS, OR OTHER ATTACHMENT DEVICES TO PIPING, FITTINGS, AND SPECIALTIES.

G. KEEP INSULATION MATERIALS DRY DURING APPLICATION AND FINISHING.

H. INSTALL INSULATION WITH TIGHT LONGITUDINAL SEAMS AND END JOINTS. BOND SEAMS AND JOINTS WITH ADHESIVE RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.

I. INSTALL INSULATION WITH LEAST NUMBER OF JOINTS PRACTICAL.

J. WHERE VAPOR BARRIER IS INDICATED, SEAL JOINTS, SEAMS, AND PENETRATIONS IN INSULATION AT HANGERS, SUPPORTS, ANCHORS, AND OTHER PROJECTIONS WITH VAPOR-BARRIER MASTIC.

1. INSTALL INSULATION CONTINUOUSLY THROUGH HANGERS AND AROUND ANCHOR ATTACHMENTS.

2. FOR INSULATION APPLICATION WHERE VAPOR BARRIERS ARE INDICATED, EXTEND INSULATION ON ANCHOR LEGS FROM POINT OF ATTACHMENT TO SUPPORTED ITEM TO POINT OF ATTACHMENT TO STRUCTURE. TAPER AND SEAL ENDS AT ATTACHMENT TO STRUCTURE WITH VAPOR-BARRIER MASTIC.

3. INSTALL INSERT MATERIALS AND INSTALL INSULATION TO TIGHTLY JOIN THE INSERT. SEAL INSULATION TO INSULATION INSERTS WITH ADHESIVE OR SEALING COMPOUND RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.

4. COVER INSERTS WITH JACKET MATERIAL MATCHING ADJACENT PIPE INSULATION. INSTALL SHIELDS OVER JACKET, ARRANGED TO PROTECT JACKET FROM TEAR OR PUNCTURE BY HANGER, SUPPORT, AND SHIELD.

K. APPLY ADHESIVES, MASTICS, AND SEALANTS AT MANUFACTURER'S RECOMMENDED COVERAGE RATE AND WET AND DRY FILM THICKNESSES.

L. INSTALL INSULATION WITH FACTORY-APPLIED JACKETS AS FOLLOWS:

1. DRAW JACKET TIGHT AND SMOOTH.

2. COVER CIRCUMFERENTIAL JOINTS WITH 3-INCH- WIDE STRIPS, OF SAME MATERIAL AS INSULATION JACKET. SECURE STRIPS WITH ADHESIVE AND OUTWARD CLINCHING STAPLES ALONG BOTH EDGES OF STRIP, SPACED 4 INCHES O.C.

3. OVERLAP JACKET LONGITUDINAL SEAMS AT LEAST 1-1/2 INCHES. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT BOTTOM OF PIPE. CLEAN AND DRY SURFACE TO RECEIVE SELF-SEALING LAP. STAPLE LAPS WITH OUTWARD CLINCHING STAPLES ALONG EDGE AT 2 INCHES O.C.

A. FOR BELOW-AMBIENT SERVICES, APPLY VAPOR-BARRIER MASTIC OVER STAPLES.

4. COVER JOINTS AND SEAMS WITH TAPE, ACCORDING TO INSULATION MATERIAL MANUFACTURER'S WRITTEN INSTRUCTIONS, TO MAINTAIN VAPOR SEAL.

5. WHERE VAPOR BARRIERS ARE INDICATED, APPLY VAPOR-BARRIER MASTIC ON SEAMS AND JOINTS AND AT ENDS ADJACENT TO PIPE FLANGES AND FITTINGS.

M. CUT INSULATION IN A MANNER TO AVOID COMPRESSING INSULATION MORE THAN 75 PERCENT OF ITS NOMINAL THICKNESS.

N. FINISH INSTALLATION WITH SYSTEMS AT OPERATING CONDITIONS. REPAIR JOINT SEPARATIONS AND CRACKING DUE TO THERMAL MOVEMENT.

O. REPAIR DAMAGED INSULATION FACINGS BY APPLYING SAME FACING MATERIAL OVER DAMAGED AREAS. EXTEND PATCHES AT LEAST 4 INCHES BEYOND DAMAGED AREAS. ADHERE, STAPLE, AND SEAL PATCHES SIMILAR TO BUTT JOINTS.

P. FOR ABOVE-AMBIENT SERVICES, DO NOT INSTALL INSULATION TO THE FOLLOWING:

1. VIBRATION-CONTROL DEVICES.

2. TESTING AGENCY LABELS AND STAMPS.

3. NAMEPLATES AND DATA PLATES.

4. CLEANOUTS.

3.2 PENETRATIONS

A. INSULATION INSTALLATION AT INTERIOR WALL AND PARTITION PENETRATIONS (THAT ARE NOT FIRE RATED): INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.

3.3 GENERAL PIPE AND EQUIPMENT INSULATION INSTALLATION

A. REQUIREMENTS IN THIS ARTICLE GENERALLY APPLY TO ALL INSULATION MATERIALS EXCEPT WHERE MORE SPECIFIC REQUIREMENTS ARE SPECIFIED IN VARIOUS PIPE INSULATION MATERIAL INSTALLATION ARTICLES.

B. INSULATION INSTALLATION ON FITTINGS, VALVES, STRAINERS, FLANGES, AND UNIONS:

1. INSTALL INSULATION OVER FITTINGS, VALVES, STRAINERS, FLANGES, UNIONS, AND OTHER SPECIALTIES WITH CONTINUOUS THERMAL AND VAPOR-RETARDER INTEGRITY UNLESS OTHERWISE INDICATED.

2. INSULATE PIPE ELBOWS USING PREFORMED FITTING INSULATION OR MITERED FITTINGS MADE FROM SAME MATERIAL AND DENSITY AS ADJACENT PIPE INSULATION. EACH PIECE SHALL BE BUTTED TIGHTLY AGAINST ADJOINING PIECE AND BONDED WITH ADHESIVE. FILL JOINTS, SEAMS, VOIDS, AND IRREGULAR SURFACES WITH INSULATING CEMENT FINISHED TO A SMOOTH, HARD, AND UNIFORM CONTOUR THAT IS UNIFORM WITH ADJOINING PIPE INSULATION.

3. INSULATE TEE FITTINGS WITH PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL AND THICKNESS AS USED FOR ADJACENT PIPE. CUT SECTIONAL PIPE INSULATION TO FIT. BUTT EACH SECTION CLOSELY TO THE NEXT AND HOLD IN PLACE WITH TIE WIRE. BOND PIECES WITH ADHESIVE.

4. INSULATE VALVES USING PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL, DENSITY, AND THICKNESS AS USED FOR ADJACENT PIPE. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER. FOR VALVES, INSULATE UP TO AND INCLUDING THE BONNETS, VALVE STUFFING-BOX STUDS, BOLTS, AND NUTS. FILL JOINTS, SEAMS, AND IRREGULAR SURFACES WITH INSULATING CEMENT.

5. INSULATE STRAINERS USING PREFORMED FITTING INSULATION OR SECTIONAL PIPE INSULATION OF SAME MATERIAL, DENSITY, AND THICKNESS AS USED FOR ADJACENT PIPE. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER. FILL JOINTS, SEAMS, AND IRREGULAR SURFACES WITH INSULATING CEMENT. INSULATE STRAINERS SO STRAINER BASKET FLANGE OR PLUG CAN BE EASILY REMOVED AND REPLACED WITHOUT DAMAGING THE INSULATION AND JACKET. PROVIDE A REMOVABLE REUSABLE INSULATION COVER. FOR BELOW-AMBIENT SERVICES, PROVIDE A DESIGN THAT MAINTAINS VAPOR BARRIER.

6. INSULATE FLANGES AND UNIONS USING A SECTION OF OVERSIZED PREFORMED PIPE INSULATION. OVERLAP ADJOINING PIPE INSULATION BY NOT LESS THAN TWO TIMES THE THICKNESS OF PIPE INSULATION, OR ONE PIPE DIAMETER, WHICHEVER IS THICKER.

7. COVER SEGMENTED INSULATED SURFACES WITH A LAYER OF FINISHING CEMENT AND COAT WITH A MASTIC. INSTALL VAPOR-BARRIER MASTIC FOR BELOW-AMBIENT SERVICES AND A BREATHER MASTIC FOR ABOVE-AMBIENT SERVICES. REINFORCE THE MASTIC WITH FABRIC-REINFORCING MESH. TROWEL THE MASTIC TO A SMOOTH AND WELL-SHAPED CONTOUR.

8. FOR SERVICES NOT SPECIFIED TO RECEIVE A FIELD-APPLIED JACKET EXCEPT FOR FLEXIBLE ELASTOMERIC AND POLYOLEFIN, INSTALL FITTED PVC COVER OVER ELBOWS, TEES, STRAINERS, VALVES, FLANGES, AND UNIONS. TERMINATE ENDS WITH PVC END CAPS. TAPE PVC COVERS TO ADJOINING INSULATION FACING USING PVC TAPE.

9. LABEL THE OUTSIDE INSULATION JACKET OF EACH UNION WITH THE WORD "UNION." MATCH SIZE AND COLOR OF PIPE LABELS.

C. INSULATE INSTRUMENT CONNECTIONS FOR THERMOMETERS, PRESSURE GAGES, PRESSURE TEMPERATURE TAPS, TEST CONNECTIONS, FLOW METERS, SENSORS, SWITCHES, AND TRANSMITTERS ON INSULATED PIPES. SHAPE INSULATION AT THESE CONNECTIONS BY TAPERING IT TO AND AROUND THE CONNECTION WITH INSULATING CEMENT AND FINISH WITH FINISHING CEMENT, MASTIC, AND FLASHING SEALANT.

3.4 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. SEAL LONGITUDINAL SEAMS AND END JOINTS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

B. INSULATION INSTALLATION ON PIPE FLANGES:

1. INSTALL PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.

2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.

3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH CUT SECTIONS OF SHEET INSULATION OF SAME THICKNESS AS PIPE INSULATION.

4. SECURE INSULATION TO FLANGES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

C. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS:

1. INSTALL MITERED SECTIONS OF PIPE INSULATION.

2. SECURE INSULATION MATERIALS AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

D. INSULATION INSTALLATION ON VALVES AND PIPE SPECIALTIES:

1. INSTALL PREFORMED VALVE COVERS MANUFACTURED OF SAME MATERIAL AS PIPE INSULATION WHEN AVAILABLE.

2. WHEN PREFORMED VALVE COVERS ARE NOT AVAILABLE, INSTALL CUT SECTIONS OF PIPE AND SHEET INSULATION TO VALVE BODY. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.

3. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR FLANGE INSULATION APPLICATION.

4. SECURE INSULATION TO VALVES AND SPECIALTIES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE TO ELIMINATE OPENINGS IN INSULATION THAT ALLOW PASSAGE OF AIR TO SURFACE BEING INSULATED.

3.5 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. INSULATION INSTALLATION ON STRAIGHT PIPES AND TUBES:

1. SECURE EACH LAYER OF PREFORMED PIPE INSULATION TO PIPE WITH WIRE OR BANDS AND TIGHTEN BANDS WITHOUT DEFORMING INSULATION MATERIALS.

2. WHERE VAPOR BARRIERS ARE INDICATED, SEAL LONGITUDINAL SEAMS, END JOINTS, AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT.

3. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON ABOVE-AMBIENT SURFACES, SECURE LAPS WITH OUTWARD CLINCHED STAPLES AT 6 INCHES (150 MM) O.C.

4. FOR INSULATION WITH FACTORY-APPLIED JACKETS ON BELOW-AMBIENT SURFACES, DO NOT STAPLE LONGITUDINAL TABS. INSTEAD, SECURE TABS WITH ADDITIONAL ADHESIVE AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER AND SEAL WITH VAPOR-BARRIER MASTIC AND FLASHING SEALANT.

B. INSULATION INSTALLATION ON PIPE FLANGES:

1. INSTALL PREFORMED PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.

2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.

3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH MINERAL-FIBER BLANKET INSULATION.

4. INSTALL JACKET MATERIAL WITH MANUFACTURER'S RECOMMENDED ADHESIVE, OVERLAP SEAMS AT LEAST 1 INCH, AND SEAL JOINTS WITH FLASHING SEALANT.

C. INSULATION INSTALLATION ON PIPE FITTINGS AND ELBOWS:

1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.

2. WHEN PREFORMED INSULATION ELBOWS AND FITTINGS ARE NOT AVAILABLE, INSTALL MITERED SECTIONS OF PIPE INSULATION, TO A THICKNESS EQUAL TO ADJOINING PIPE INSULATION. SECURE INSULATION MATERIALS WITH WIRE OR BANDS.

D. INSULATION INSTALLATION ON VALVES AND PIPE SPECIALTIES:

1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE.

2. WHEN PREFORMED SECTIONS ARE NOT AVAILABLE, INSTALL MITERED SECTIONS OF PIPE INSULATION TO VALVE BODY.

3. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.

4. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR FLANGE INSULATION APPLICATION.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. WHERE PVC JACKETS ARE INDICATED, INSTALL WITH 1-INCH (25-MM) OVERLAP AT LONGITUDINAL SEAMS AND END JOINTS. SEAL WITH MANUFACTURER'S RECOMMENDED ADHESIVE.

1. APPLY TWO CONTINUOUS BEADS OF ADHESIVE TO SEAMS AND JOINTS, ONE BEAD UNDER LAP AND THE FINISH BEAD ALONG SEAM AND JOINT EDGE.

B. WHERE METAL JACKETS ARE INDICATED, INSTALL WITH 2-INCH (50-MM) OVERLAP AT LONGITUDINAL SEAMS AND END JOINTS. OVERLAP LONGITUDINAL SEAMS ARRANGED TO SHED WATER. SEAL END JOINTS WITH WEATHERPROOF SEALANT RECOMMENDED BY INSULATION MANUFACTURER. SECURE JACKET WITH STAINLESS-STEEL BANDS 12 INCHES (300 MM) O.C. AND AT END JOINTS.

3.7 PIPING INSULATION SCHEDULE, GENERAL

A. ACCEPTABLE PREFORMED PIPE AND TUBULAR INSULATION MATERIALS AND THICKNESSES ARE IDENTIFIED FOR EACH PIPING SYSTEM AND PIPE SIZE RANGE. IF MORE THAN ONE MATERIAL IS LISTED FOR A PIPING SYSTEM, SELECTION FROM MATERIALS LISTED IS CONTRACTOR'S OPTION.

B. ITEMS NOT INSULATED: UNLESS OTHERWISE INDICATED, DO NOT INSTALL INSULATION ON THE FOLLOWING:

1. UNDERGROUND PIPING.

2. CHROME-PLATED PIPES AND FITTINGS UNLESS THERE IS A POTENTIAL FOR PERSONNEL INJURY.

3.8 INDOOR PIPING INSULATION SCHEDULE

A. DOMESTIC COLD WATER AND COLD NON-POTABLE WATER:

1. NPS 1 AND SMALLER: INSULATION SHALL BE THE FOLLOWING:

A. FLEXIBLE ELASTOMERIC: 1/2 INCH THICK.

2. NPS 1-1/4 (DN 32) AND LARGER: INSULATION SHALL BE THE FOLLOWING:

A. FLEXIBLE ELASTOMERIC: 1-INCH THICK.

B. DOMESTIC HOT AND RECIRCULATED HOT WATER:

1. NPS 1-1/4 (DN 32) AND SMALLER: INSULATION SHALL BE ONE OF THE FOLLOWING:

A. FLEXIBLE ELASTOMERIC: 1-INCH THICK.

B. MINERAL-FIBER, PREFORMED PIPE INSULATION WITH ASJ, TYPE I: 1-INCH THICK.

C. EXPOSED SANITARY DRAINS, DOMESTIC WATER, DOMESTIC HOT WATER, AND STOPS FOR PLUMBING FIXTURES FOR PEOPLE WITH DISABILITIES:

1. ALL PIPE SIZES: INSULATION SHALL BE THE FOLLOWING:

A. PROTECTIVE SHIELDING GUARDS.

B. PROTECTIVE LAVATORY SHIELDS.

3.9 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. INSTALL JACKET OVER INSULATION MATERIAL. FOR INSULATION WITH FACTORY-APPLIED JACKET, INSTALL THE FIELD-APPLIED JACKET OVER THE FACTORY-APPLIED JACKET.

B. IF MORE THAN ONE MATERIAL IS LISTED, SELECTION FROM MATERIALS LISTED IS CONTRACTOR'S OPTION.

C. PIPING, CONCEALED:

1. NONE.

D. PIPING, EXPOSED TO OCCUPANT VIEW:

1. PVC: 30 MILS (0.8 MM) THICK.

END OF SECTION 220719

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KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED PROFESSIONAL ENGINEER – 10/20/2021

REVISIONS

SHEET TITLE:

SPECIFICATIONS

P5.3

SECTION 221116 - DOMESTIC WATER PIPING
PART 1 - GENERAL
1.1 SUMMARY
A. SECTION INCLUDES DOMESTIC WATER PIPES, TUBES, AND FITTINGS INSIDE BUILDINGS.
1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR TRANSITION FITTINGS AND DIELECTRIC FITTINGS.
PART 2 - PRODUCTS
2.1 PIPING MATERIALS
A. COMPLY WITH REQUIREMENTS IN "PIPING SCHEDULE" ARTICLE FOR APPLICATIONS OF PIPE, TUBE, FITTING MATERIALS, AND JOINING METHODS FOR SPECIFIC SERVICES, SERVICE LOCATIONS, AND PIPE SIZES.
B. POTABLE-WATER PIPING AND COMPONENTS SHALL COMPLY WITH NSF 14 AND NSF 61 ANNEX G. PLASTIC PIPING COMPONENTS SHALL BE MARKED WITH "NSF-PW."
2.2 COPPER TUBE AND FITTINGS
A. HARD COPPER TUBE: ASTM B 88, TYPE L (ASTM B 88M, TYPE B) WATER TUBE, DRAWN TEMPER.
B. SOFT COPPER TUBE: ASTM B 88, TYPE K (ASTM B 88M, TYPE A) WATER TUBE, ANNEALED TEMPER.
C. CAST-COPPER, SOLDER-JOINT FITTINGS: ASME B16.18, PRESSURE FITTINGS.
D. WROUGHT-COPPER, SOLDER-JOINT FITTINGS: ASME B16.22, WROUGHT-COPPER PRESSURE FITTINGS.
E. COPPER UNIONS:
1. MSS SP-123.
2. CAST-COPPER-ALLOY, HEXAGONAL-STOCK BODY.
3. BALL-AND-SOCKET, METAL-TO-METAL SEATING SURFACES.
4. SOLDER-JOINT OR THREADED ENDS.
F. COPPER PRESSURE-SEAL-JOINT FITTINGS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. VIEGA LLC, WICHITA, KS - PROPRESS SYSTEM WITH SMART CONNECT FEATURE.
B. OR APPROVED EQUAL.
2. FITTINGS FOR NPS 2 AND SMALLER: WROUGHT-COPPER FITTING WITH EPDM (COLOR SHINY BLACK) IN COPPER AND STAINLESS STEEL FITTINGS FOR HYDRONIC, POTABLE WATER, AND DRAIN SYSTEMS.
3. SMART CONNECT FEATURE PROVIDES A LEAKAGE PATH TO ALLOW WATER AND AIR TO LEAK PAST ANY UNPRESSED CONNECTION, FOR QUICK IDENTIFICATION DURING PRESSURE TESTING.
2.3 PIPING JOINING MATERIALS
A. PIPE-FLANGE GASKET MATERIALS:
1. AWWA C110/A21.10, RUBBER, FLAT FACE, 1/8 INCH (3.2 MM) THICK OR ASME B16.21, NONMETALLIC AND ASBESTOS FREE UNLESS OTHERWISE INDICATED.
2. FULL-FACE OR RING TYPE UNLESS OTHERWISE INDICATED.
B. METAL, PIPE-FLANGE BOLTS AND NUTS: ASME B18.2.1, CARBON STEEL UNLESS OTHERWISE INDICATED.
2.4 SOLDER MATERIALS:
A. MANUFACTURERS:
1. HARRIS (PRODUCT: STAY-BRITE).
2. LUCAS-MILHAUPT (PRODUCT: SILVABRITE).
3. NO SUBSTITUTIONS.
B. NOMINAL COMPOSITION: ALLOY OF SILVER AND TIN (3-6 PERCENT AG, REMAINDER SN), LEAD AND ANTIMONY-FREE.
C. PHYSICAL PROPERTIES:
1. COLOR: BRIGHT SILVER
2. SOLIDUS: 430 DEGREES F (221 DEGREES C)
3. LIQUIDUS: 430 DEGREES F (221 DEGREES C)
4. ELECTRICAL CONDUCTIVITY: 16.4 PERCENT IACS
5. SHEAR STRENGTH: 10,600 PSI (73 MPA)
6. TENSILE STRENGTH: 14,000 PSI (96 MPA)
7. ELONGATION: 48 PERCENT
D. SPECIFICATION COMPLIANCE:
1. NSF 51
2. ASTM B32-89, ALLOY GRADE SN96
3. FEDERAL SPEC. QQ-S-571E, CLASS SN 96 WITH EXCEPTION TO QPL PARAGRAPH 3.1
4. J-STD-006, SN96AG04A
E. FLUX: ASTM B 813, WATER FLUSHABLE.
1. HARRIS (PRODUCT: STAY CLEAN PASTE FLUX, STAY CLEAN LIQUID FLUX (USED WITH 4 INCH OR LARGER COPPER TUBING ALSO STAINLESS STEELS), OR BRIDGIT WATER SOLUBLE PASTE FLUX).
2. CANFIELD (PRODUCT: AQUA-BRITE OR AB CREAM FLUX). GLYCERIN-BASED, WATER SOLUBLE.
2.5 TRANSITION FITTINGS
A. GENERAL REQUIREMENTS:
1. SAME SIZE AS PIPES TO BE JOINED.
2. PRESSURE RATING AT LEAST EQUAL TO PIPES TO BE JOINED.
3. END CONNECTIONS COMPATIBLE WITH PIPES TO BE JOINED.
B. FITTING-TYPE TRANSITION COUPLINGS: MANUFACTURED PIPING COUPLING OR SPECIFIED PIPING SYSTEM FITTING.
2.6 DIELECTRIC FITTINGS
A. GENERAL REQUIREMENTS: ASSEMBLY OF COPPER ALLOY AND FERROUS MATERIALS WITH SEPARATING NONCONDUCTIVE INSULATING MATERIAL. INCLUDE END CONNECTIONS COMPATIBLE WITH PIPES TO BE JOINED.
B. DIELECTRIC UNIONS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. CAPITOL MANUFACTURING COMPANY; MEMBER OF THE PHOENIX FORGE GROUP.
B. CENTRAL PLASTICS COMPANY.
C. HART INDUSTRIES INTERNATIONAL, INC.
D. JOMAR INTERNATIONAL.
E. MATCO-NORCA.
F. MCDONALD, A. Y. MFG. CO.
G. WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.
H. WILKINS; A ZURN COMPANY.
2. STANDARD: ASSE 1079.
3. PRESSURE RATING: 125 PSIG (860 KPA) MINIMUM AT 180 DEG F (82 DEG C).END CONNECTIONS: SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS.
C. DIELECTRIC NIPPLES:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. ELSTER PERFECTION CORPORATION.
B. GRINNELL MECHANICAL PRODUCTS; TYCO FIRE PRODUCTS LP.
C. MATCO-NORCA.
D. PRECISION PLUMBING PRODUCTS, INC.
E. VICTAULIC COMPANY.
2. STANDARD: IAPMO PS 66.
3. ELECTROPLATED STEEL NIPPLE COMPLYING WITH ASTM F1545.
4. PRESSURE RATING AND TEMPERATURE: 300 PSIG (2,070 KPA) AT 225 DEG F (107 DEG C).
5. END CONNECTIONS: MALE THREADED OR GROOVED.
6. LINING: INERT AND NONCORROSIVE, PROPYLENE.
PART 3 - EXECUTION
3.1 PIPING INSTALLATION
A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF DOMESTIC WATER PIPING. INDICATED LOCATIONS AND ARRANGEMENTS ARE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.
B. INSTALL SHUTOFF VALVE, HOSE-END DRAIN VALVE, STRAINER, PRESSURE GAGE, AND TEST TEE WITH VALVE INSIDE THE BUILDING AT EACH DOMESTIC WATER-SERVICE ENTRANCE. COMPLY WITH REQUIREMENTS FOR PRESSURE GAGES IN SECTION 220519 "METERS AND GAGES FOR PLUMBING PIPING" AND WITH REQUIREMENTS FOR DRAIN VALVES AND STRAINERS IN SECTION 221119 "DOMESTIC WATER PIPING SPECIALTIES."
C. INSTALL SHUTOFF VALVE IMMEDIATELY UPSTREAM OF EACH DIELECTRIC FITTING.
D. INSTALL WATER PIPING LEVEL WITH 0.25 PERCENT SLOPE DOWNWARD TOWARD DRAIN AND PLUMB.
E. INSTALL PIPING CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
F. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
G. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL, AND COORDINATE WITH OTHER SERVICES OCCUPYING THAT SPACE.
H. INSTALL PIPING TO PERMIT VALVE SERVICING.
I. INSTALL NIPPLES, UNIONS, SPECIAL FITTINGS, AND VALVES WITH PRESSURE RATINGS THE SAME AS OR HIGHER THAN THE SYSTEM PRESSURE RATING USED IN APPLICATIONS BELOW UNLESS OTHERWISE INDICATED.
J. INSTALL PIPING FREE OF SAGS AND BENDS.
K. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.
L. INSTALL UNIONS IN COPPER TUBING AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT, MACHINE, AND SPECIALTY.
3.2 JOINT CONSTRUCTION
A. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE.
B. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF PIPES, TUBES, AND FITTINGS BEFORE ASSEMBLY.
C. THREADED JOINTS: THREAD PIPE WITH TAPERED PIPE THREADS ACCORDING TO ASME B1.20.1. CUT THREADS FULL AND CLEAN USING SHARP DIES. REAM THREADED PIPE ENDS TO REMOVE BURRS AND RESTORE FULL ID. JOIN PIPE FITTINGS AND VALVES AS FOLLOWS:
1. APPLY APPROPRIATE TAPE OR THREAD COMPOUND TO EXTERNAL PIPE THREADS.
2. DAMAGED THREADS: DO NOT USE PIPE OR PIPE FITTINGS WITH THREADS THAT ARE CORRODED OR DAMAGED.
D. SOLDERED JOINTS FOR COPPER TUBING: APPLY ASTM B 813, WATER-FLUSHABLE FLUX TO END OF TUBE. JOIN COPPER TUBE AND FITTINGS ACCORDING TO ASTM B 828 OR CDA'S "COPPER TUBE HANDBOOK."
E. PRESSURE-SEALED JOINTS FOR COPPER TUBING: JOIN COPPER TUBE AND PRESSURE-SEAL FITTINGS WITH TOOLS RECOMMENDED BY FITTING MANUFACTURER.
F. FLANGED JOINTS: SELECT APPROPRIATE ASBESTOS-FREE, NONMETALLIC GASKET MATERIAL IN SIZE, TYPE, AND THICKNESS SUITABLE FOR DOMESTIC WATER SERVICE. JOIN FLANGES WITH GASKET AND BOLTS ACCORDING TO ASME B31.9.
G. JOINTS FOR DISSIMILAR-MATERIAL PIPING: MAKE JOINTS USING ADAPTERS COMPATIBLE WITH MATERIALS OF BOTH PIPING SYSTEMS.
3.3 TRANSITION FITTING INSTALLATION
A. INSTALL TRANSITION COUPLINGS AT JOINTS OF DISSIMILAR PIPING.
3.4 DIELECTRIC FITTING INSTALLATION
A. INSTALL DIELECTRIC FITTINGS IN PIPING AT CONNECTIONS OF DISSIMILAR METAL PIPING AND TUBING.
B. DIELECTRIC FITTINGS: USE DIELECTRIC COUPLINGS OR NIPPLES.
3.5 HANGER AND SUPPORT INSTALLATION
A. COMPLY WITH REQUIREMENTS FOR PIPE HANGER, SUPPORT PRODUCTS, AND INSTALLATION IN SECTION 220529 "HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT."
1. VERTICAL PIPING: MSS TYPE 8 OR 42, CLAMPS.
2. INDIVIDUAL, STRAIGHT, HORIZONTAL PIPING RUNS: MSS TYPE 1, ADJUSTABLE, STEEL CLEVIS OR J-TYPE HANGERS.
B. SUPPORT VERTICAL PIPING AND TUBING AT BASE AND AT EACH FLOOR.
C. ROD DIAMETER MAY BE REDUCED ONE SIZE FOR DOUBLE-ROD HANGERS, TO A MINIMUM OF 3/8 INCH (10 MM).
D. INSTALL HANGERS FOR COPPER TUBING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
1. NPS 3/4 (DN 20) AND SMALLER: 60 INCHES (1500 MM) WITH 3/8-INCH (10-MM) ROD.
2. NPS 1 AND NPS 1-1/4 (DN 25 AND DN 32): 72 INCHES (1800 MM) WITH 3/8-INCH (10-MM) ROD.
E. INSTALL SUPPORTS FOR VERTICAL COPPER TUBING AT TOP AND BOTTOM OF RISER, AND AT NO MORE THAN 8 FEET (2.4 M) ON CENTER.
F. SUPPORT PIPING AND TUBING NOT LISTED IN THIS ARTICLE ACCORDING TO MSS SP-69 AND MANUFACTURER'S WRITTEN INSTRUCTIONS.
3.6 CONNECTIONS
A. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.
B. WHEN INSTALLING PIPING ADJACENT TO EQUIPMENT AND MACHINES, ALLOW SPACE FOR SERVICE AND MAINTENANCE.
C. CONNECT DOMESTIC WATER PIPING TO EXTERIOR WATER-SERVICE PIPING. USE TRANSITION FITTING TO JOIN DISSIMILAR PIPING MATERIALS.
D. CONNECT DOMESTIC WATER PIPING TO WATER-SERVICE PIPING WITH SHUTOFF VALVE; EXTEND AND CONNECT TO THE FOLLOWING:
1. WATER HEATERS: COLD-WATER INLET AND HOT-WATER OUTLET PIPING IN SIZES INDICATED, BUT NOT SMALLER THAN SIZES OF WATER HEATER CONNECTIONS.
2. PLUMBING FIXTURES: COLD- AND HOT-WATER-SUPPLY PIPING IN SIZES INDICATED, BUT NOT SMALLER THAN THAT REQUIRED BY PLUMBING CODE.
3. EQUIPMENT: COLD- AND HOT-WATER-SUPPLY PIPING AS INDICATED, BUT NOT SMALLER THAN EQUIPMENT CONNECTIONS. PROVIDE SHUTOFF VALVE AND UNION FOR EACH CONNECTION.
3.7 IDENTIFICATION
A. IDENTIFY SYSTEM COMPONENTS. COMPLY WITH REQUIREMENTS FOR IDENTIFICATION MATERIALS AND INSTALLATION IN SECTION 220553 "IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT."
B. LABEL PRESSURE PIPING WITH SYSTEM OPERATING PRESSURE.
3.8 FIELD QUALITY CONTROL
A. PERFORM THE FOLLOWING TESTS AND INSPECTIONS:
1. PIPING INSPECTIONS:
A. DO NOT ENCLOSE, COVER, OR PUT PIPING INTO OPERATION UNTIL IT HAS BEEN INSPECTED AND APPROVED BY AUTHORITIES HAVING JURISDICTION.
B. DURING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST ONE DAY BEFORE INSPECTION MUST BE MADE. PERFORM TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION:
1) ROUGHING-IN INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCEALING OR CLOSING IN AFTER ROUGHING IN AND BEFORE SETTING FIXTURES.
2) FINAL INSPECTION: ARRANGE FOR AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED IN "PIPING TESTS" SUBPARAGRAPH BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.
C. REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TESTS OR INSPECTIONS, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.
D. REPORTS: PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.
2. PIPING TESTS:
A. FILL DOMESTIC WATER PIPING. CHECK COMPONENTS TO DETERMINE THAT THEY ARE NOT AIR BOUND AND THAT PIPING IS FULL OF WATER.
B. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT A SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
C. LEAVE NEW, ALTERED, EXTENDED, OR REPLACED DOMESTIC WATER PIPING UNCOVERED AND UNCONCEALED UNTIL IT HAS BEEN TESTED AND APPROVED. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
D. CAP AND SUBJECT PIPING TO STATIC WATER PRESSURE OF 50 PSIG (345 KPA) ABOVE OPERATING PRESSURE, WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS. ISOLATE TEST SOURCE AND ALLOW IT TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED.
E. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS, AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
F. PREPARE REPORTS FOR TESTS AND FOR CORRECTIVE ACTION REQUIRED.
B. DOMESTIC WATER PIPING WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
C. PREPARE TEST AND INSPECTION REPORTS.
3.9 ADJUSTING
A. PERFORM THE FOLLOWING ADJUSTMENTS BEFORE OPERATION:
1. CLOSE DRAIN VALVES, HYDRANTS, AND HOSE BIBBS.
2. OPEN SHUTOFF VALVES TO FULLY OPEN POSITION.
3. OPEN THROTTLING VALVES TO PROPER SETTING.
4. ADJUST BALANCING VALVES IN HOT-WATER-CIRCULATION RETURN PIPING TO PROVIDE ADEQUATE FLOW.
A. MANUALLY ADJUST BALL-TYPE BALANCING VALVES IN HOT-WATER-CIRCULATION RETURN PIPING TO PROVIDE HOT-WATER FLOW IN EACH BRANCH.
B. ADJUST CALIBRATED BALANCING VALVES TO FLOWS INDICATED.
5. REMOVE PLUGS USED DURING TESTING OF PIPING AND FOR TEMPORARY SEALING OF PIPING DURING INSTALLATION.
6. REMOVE AND CLEAN STRAINER SCREENS. CLOSE DRAIN VALVES AND REPLACE DRAIN PLUGS.
7. REMOVE FILTER CARTRIDGES FROM HOUSINGS AND VERIFY THAT CARTRIDGES ARE AS SPECIFIED FOR APPLICATION WHERE USED AND ARE CLEAN AND READY FOR USE.
8. CHECK PLUMBING SPECIALTIES AND VERIFY PROPER SETTINGS, ADJUSTMENTS, AND OPERATION.
3.10 CLEANING
A. CLEAN AND DISINFECT POTABLE DOMESTIC WATER PIPING AS FOLLOWS:
1. PURGE NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED BEFORE USING.
2. USE PURGING AND DISINFECTING PROCEDURES PRESCRIBED BY AUTHORITIES HAVING JURISDICTION; IF METHODS ARE NOT PRESCRIBED, USE PROCEDURES DESCRIBED IN EITHER AWWA C651 OR AWWA C652 OR FOLLOW PROCEDURES DESCRIBED BELOW:
A. FLUSH PIPING SYSTEM WITH CLEAN, POTABLE WATER UNTIL DIRTY WATER DOES NOT APPEAR AT OUTLETS.
B. FILL AND ISOLATE SYSTEM ACCORDING TO EITHER OF THE FOLLOWING:
1) FILL SYSTEM OR PART THEREOF WITH WATER/CHLORINE SOLUTION WITH AT LEAST 50 PPM (50 MG/L) OF CHLORINE. ISOLATE WITH VALVES AND ALLOW TO STAND FOR 24 HOURS.
2) FILL SYSTEM OR PART THEREOF WITH WATER/CHLORINE SOLUTION WITH AT LEAST 200 PPM (200 MG/L) OF CHLORINE. ISOLATE AND ALLOW TO STAND FOR THREE HOURS.
C. FLUSH SYSTEM WITH CLEAN, POTABLE WATER UNTIL NO CHLORINE IS IN WATER COMING FROM SYSTEM AFTER THE STANDING TIME.
D. REPEAT PROCEDURES IF BIOLOGICAL EXAMINATION SHOWS CONTAMINATION.
E. SUBMIT WATER SAMPLES IN STERILE BOTTLES TO AUTHORITIES HAVING JURISDICTION.
B. PREPARE AND SUBMIT REPORTS OF PURGING AND DISINFECTING ACTIVITIES. INCLUDE COPIES OF WATER-SAMPLE APPROVALS FROM AUTHORITIES HAVING JURISDICTION.
C. CLEAN INTERIOR OF DOMESTIC WATER PIPING SYSTEM. REMOVE DIRT AND DEBRIS AS WORK PROGRESSES.
3.11 PIPING SCHEDULE
A. TRANSITION AND SPECIAL FITTINGS WITH PRESSURE RATINGS AT LEAST EQUAL TO PIPING RATING MAY BE USED IN APPLICATIONS BELOW UNLESS OTHERWISE INDICATED.
B. FLANGES AND UNIONS MAY BE USED FOR PIPING JOINTS UNLESS OTHERWISE INDICATED.
C. DOMESTIC WATER PIPING SHALL BE THE FOLLOWING:
1. PIPING WITHIN 10 FEET (3 M) OF THE WATER HEATER OR BOILER, MEASURED ALONG THE RUN OF PIPING, SHALL BE HARD COPPER TUBING.
A. HARD COPPER TUBE, TYPE L; COPPER PRESSURE-SEAL-JOINT FITTINGS; AND PRESSURE-SEALED JOINTS.
B. HARD COPPER TUBE, TYPE L; SOLDER-JOINT FITTINGS; AND SOLDERED JOINTS.
2. PIPING FARTHER FROM THE WATER HEATER OR BOILER, AND RUNOUTS TO INDIVIDUAL FIXTURES, SHALL BE HARD COPPER TUBING.
A. HARD COPPER TUBE, TYPE L; COPPER PRESSURE-SEAL-JOINT FITTINGS; AND PRESSURE-SEALED JOINTS.
B. HARD COPPER TUBE, TYPE L; SOLDER-JOINT FITTINGS; AND SOLDERED JOINTS.
3. CONCEALED AND UNDERSLAB RUNOUTS TO TRAP PRIMER FITTINGS ON FLOOR DRAINS AND SIMILAR FIXTURES SHALL BE HARD COPPER TUBING.
A. HARD COPPER TUBE, TYPE K; SOLDER-JOINT FITTINGS; AND SOLDERED JOINTS.
END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES
PART 1 - GENERAL
1.1 SUMMARY
A. SECTION INCLUDES:
1. VACUUM BREAKERS.
2. BACKFLOW PREVENTERS.
3. BALANCING VALVES.
4. TEMPERATURE-ACTUATED, WATER MIXING VALVES.
5. STRAINERS.
6. HOSE BIBBS.
7. DRAIN VALVES.
1.2 ACTION SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.
PART 2 - PRODUCTS
2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES
A. POTABLE-WATER PIPING AND COMPONENTS SHALL COMPLY WITH NSF 61 ANNEX G. MARK "NSF-PW" ON PLASTIC PIPING COMPONENTS.
2.2 PERFORMANCE REQUIREMENTS
A. MINIMUM WORKING PRESSURE FOR DOMESTIC WATER PIPING SPECIALTIES: 125 PSIG UNLESS OTHERWISE INDICATED.
2.3 VACUUM BREAKERS
A. PIPE-APPLIED, ATMOSPHERIC-TYPE VACUUM BREAKERS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. CONBRACO INDUSTRIES, INC.
B. WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.
C. ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; WILKINS WATER CONTROL PRODUCTS.
2. STANDARD: ASSE 1001.
3. SIZE: NPS 1/4 TO NPS 3 (DN 8 TO DN 80), AS REQUIRED TO MATCH CONNECTED PIPING.
4. BODY: BRONZE.
5. INLET AND OUTLET CONNECTIONS: THREADED.
6. FINISH: ROUGH BRONZE.
B. HOSE-CONNECTION VACUUM BREAKERS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. CONBRACO INDUSTRIES, INC.
B. MIFAB, INC.
C. WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.
D. WOODFORD MANUFACTURING COMPANY; A DIVISION OF WCM INDUSTRIES, INC.
E. ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; LIGHT COMMERCIAL PRODUCTS.
2. STANDARD: ASSE 1011.
3. BODY: BRONZE, NONREMOVABLE, WITH MANUAL DRAIN.
4. OUTLET CONNECTION: GARDEN-HOSE THREADED COMPLYING WITH ASME B1.20.7.
5. FINISH: ROUGH BRONZE.
2.4 BACKFLOW PREVENTERS
A. REDUCED-PRESSURE-PRINCIPLE BACKFLOW PREVENTERS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. CONBRACO INDUSTRIES, INC.
B. WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.
C. ZURN INDUSTRIES, LLC; PLUMBING PRODUCTS GROUP; WILKINS WATER CONTROL PRODUCTS.
2. STANDARD: ASSE 1013.
3. OPERATION: CONTINUOUS-PRESSURE APPLICATIONS.
4. PRESSURE LOSS: 10 PSIG (90 KPA) MAXIMUM UNLESS OTHERWISE INDICATED, THROUGH MIDDLE THIRD OF FLOW RANGE.
5. SIZE: LINE SIZE AS INDICATED ON THE DRAWINGS.
6. BODY: BRONZE FOR NPS 2 (DN 50) AND SMALLER.
7. END CONNECTIONS: THREADED FOR NPS 2 (DN 50) AND SMALLER.
8. CONFIGURATION: DESIGNED FOR HORIZONTAL, STRAIGHT-THROUGH FLOW; SUITABLE FOR VERTICAL INSTALLATION WITH UPWARD FLOW.
9. ACCESSORIES:
A. VALVES NPS 2 AND SMALLER: BALL TYPE WITH THREADED ENDS ON INLET AND OUTLET.
B. STRAINER: BRONZE BODY, WYE TYPE, STAINLESS STEEL SCREEN, PLUG.
C. AIR-GAP FITTING: ASME A112.1.2, MATCHING BACKFLOW-PREVENTER CONNECTION.
2.5 BALANCING VALVES
A. MEMORY-STOP BALANCING VALVES:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. ARMSTRONG INTERNATIONAL, INC.
B. FLO FAB INC.
C. ITT CORPORATION; BELL & GOSSETT DIV.
D. NIBCO INC.
E. TACO INCORPORATED.
F. WATTS; A DIVISION OF WATTS WATER TECHNOLOGIES, INC.; WATTS REGULATOR COMPANY.
2. TYPE: BALL OR Y-PATTERN GLOBE VALVE WITH TWO READOUT PORTS AND MEMORY-SETTING INDICATOR.
3. PRESSURE RATING: 200-PSIG (1380-KPA) MINIMUM CWP.
4. SIZE: NPS 2 (DN 50) OR SMALLER.
5. BODY: COPPER ALLOY.
6. PORT: STANDARD OR FULL PORT.
7. BALL: CHROME-PLATED BRASS.
8. SEATS AND SEALS: REPLACEABLE.
9. END CONNECTIONS: SOLDER JOINT OR THREADED.
10. HANDLE: VINYL-COVERED STEEL WITH MEMORY-SETTING DEVICE.
2.6 TEMPERATURE-ACTUATED, WATER MIXING VALVES
A. PRIMARY, THERMOSTATIC, WATER MIXING VALVES:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. LEONARD VALVE COMPANY.
B. WATTS WATER TECHNOLOGIES, INC.
C. SYMMONS INDUSTRIES, INC.
2. STANDARD: ASSE 1070.
3. PRESSURE RATING: 125 PSIG MINIMUM UNLESS OTHERWISE INDICATED.
4. TYPE: EXPOSED-MOUNTED, THERMOSTATICALLY CONTROLLED, WATER MIXING VALVE.
5. MATERIAL: BRONZE BODY WITH CORROSION-RESISTANT INTERIOR COMPONENTS.
6. CONNECTIONS: THREADED UNION INLETS AND OUTLET.
7. TEMPERED-WATER SETTING: 110° F.
8. VALVE FINISH: ROUGH BRONZE.
9. PIPING FINISH: COPPER.
2.7 STRAINERS FOR DOMESTIC WATER PIPING
A. Y-PATTERN STRAINERS:
1. PRESSURE RATING: 125 PSIG MINIMUM UNLESS OTHERWISE INDICATED.
2. BODY: BRONZE.
3. END CONNECTIONS: THREADED FOR NPS 2 AND SMALLER; THREADED OR FLANGED FOR NPS 2-1/2 AND LARGER.
4. SCREEN: STAINLESS STEEL WITH ROUND PERFORATIONS UNLESS OTHERWISE INDICATED.
5. PERFORATION SIZE:
A. STRAINERS NPS 2 AND SMALLER: 0.020-INCH.
6. DRAIN: FACTORY-INSTALLED, HOSE-END DRAIN VALVE.
2.8 HOSE BIBBS
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:
1. CHICAGO FAUCETS.
2. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456823391&MF=&SRC=WD" PRIER PRODUCTS, INC.
3. HYPERLINK "HTTP://WWW.SPECAGENT.COM/LOOKUP/?UID=123456808915&MF=&SRC=WD" WOODFORD MANUFACTURING CO.
4. ZURN INDUSTRIES.
B. HOSE BIBBS:
1. STANDARD: ASME A112.18.1 FOR SEDIMENT FAUCETS.
2. BODY MATERIAL: BRONZE.
3. SEAT: BRONZE, REPLACEABLE.
4. SUPPLY CONNECTIONS: NPS 1/2 OR NPS 3/4 (DN 15 OR DN 20) THREADED OR SOLDER-JOINT INLET.
5. OUTLET CONNECTION: GARDEN-HOSE THREAD COMPLYING WITH ASME B1.20.7.
6. PRESSURE RATING: 125 PSIG (860 KPA).
7. VACUUM BREAKER: INTEGRAL NONREMOVABLE, DRAINABLE, HOSE-CONNECTION VACUUM BREAKER COMPLYING WITH ASSE 1011.
8. FINISH FOR EQUIPMENT ROOMS: ROUGH BRONZE, OR CHROME OR NICKEL PLATED.
9. FINISH FOR SERVICE AREAS: ROUGH BRONZE, OR CHROME OR NICKEL PLATED.
10. FINISH FOR FINISHED ROOMS: CHROME OR NICKEL PLATED.
11. OPERATION FOR EQUIPMENT AND SERVICE ROOMS: WHEEL HANDLE OR OPERATING KEY.
12. OPERATION FOR FINISHED ROOMS: OPERATING KEY.
13. INCLUDE OPERATING KEY WITH EACH OPERATING-KEY HOSE BIBB.
14. INCLUDE INTEGRAL WALL FLANGE WITH EACH CHROME- OR NICKEL-PLATED HOSE BIBB.
2.9 DRAIN VALVES
A. BALL-VALVE-TYPE, HOSE-END DRAIN VALVES:
1. STANDARD: MSS SP-110 FOR STANDARD-PORT, TWO-PIECE BALL VALVES.
2. PRESSURE RATING: 400-PSIG (2760-KPA) MINIMUM CWP.
3. SIZE: NPS 3/4 (DN 20).
4. BODY: COPPER ALLOY.
5. BALL: CHROME-PLATED BRASS.
6. SEATS AND SEALS: REPLACEABLE.
7. HANDLE: VINYL-COVERED STEEL.
8. INLET: THREADED OR SOLDER JOINT.
9. OUTLET: THREADED, SHORT NIPPLE WITH GARDEN-HOSE THREAD COMPLYING WITH ASME B1.20.7 AND CAP WITH BRASS CHAIN.
PART 3 - EXECUTION
3.1 INSTALLATION
A. PROVIDE DRAIN VALVES AT LOW POINTS AND OTHER POINTS AS INDICATED AND AS REQUIRED TO ENABLE COMPLETE DRAINING OF THE WATER PIPING SYSTEMS.
B. INSTALL BACKFLOW PREVENTERS IN EACH WATER SUPPLY TO MECHANICAL EQUIPMENT AND SYSTEMS AND TO OTHER EQUIPMENT AND WATER SYSTEMS THAT MAY BE SOURCES OF CONTAMINATION. COMPLY WITH AUTHORITIES HAVING JURISDICTION.
1. LOCATE BACKFLOW PREVENTERS IN SAME ROOM AS CONNECTED EQUIPMENT OR SYSTEM.
2. INSTALL DRAIN FOR BACKFLOW PREVENTERS WITH ATMOSPHERIC-VENT DRAIN CONNECTION WITH AIR-GAP FITTING, FIXED AIR-GAP FITTING, OR EQUIVALENT POSITIVE PIPE SEPARATION OF AT LEAST TWO PIPE DIAMETERS IN DRAIN PIPING AND PIPE-TO-FLOOR DRAIN. LOCATE AIR-GAP DEVICE ATTACHED TO OR UNDER BACKFLOW PREVENTER. SIMPLE AIR BREAKS ARE UNACCEPTABLE FOR THIS APPLICATION.
3. DO NOT INSTALL BYPASS PIPING AROUND BACKFLOW PREVENTERS.
C. INSTALL BALANCING VALVES IN LOCATIONS WHERE THEY CAN EASILY BE ADJUSTED.
D. INSTALL TEMPERATURE-ACTUATED, WATER MIXING VALVES WITH CHECK STOPS OR SHUTOFF VALVES ON INLETS AND WITH SHUTOFF VALVE ON OUTLET.
E. INSTALL Y-PATTERN STRAINERS FOR WATER ON SUPPLY SIDE OF EACH CONTROL VALVE, WATER PRESSURE-REDUCING VALVE, SOLENOID VALVE, AND PUMP.
3.2 LABELING AND IDENTIFYING
A. EQUIPMENT NAMEPLATES AND SIGNS: INSTALL ENGRAVED PLASTIC-LAMINATE EQUIPMENT NAMEPLATE OR SIGN ON OR NEAR EACH OF THE FOLLOWING:
1. PRESSURE VACUUM BREAKERS.
2. BACKFLOW PREVENTERS.
3. WATER PRESSURE-REDUCING VALVES.
B. DISTINGUISH AMONG MULTIPLE UNITS, INFORM OPERATOR OF OPERATIONAL REQUIREMENTS, INDICATE SAFETY AND EMERGENCY PRECAUTIONS, AND WARN OF HAZARDS AND IMPROPER OPERATIONS, IN ADDITION TO IDENTIFYING UNIT. NAMEPLATES AND SIGNS ARE SPECIFIED IN SECTION 220553 "IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT."
3.3 FIELD QUALITY CONTROL
A. PERFORM THE FOLLOWING TESTS AND INSPECTIONS:
1. TEST EACH VACUUM BREAKER AND BACKFLOW PREVENTER ACCORDING TO AUTHORITIES HAVING JURISDICTION AND THE DEVICE'S REFERENCE STANDARD.
B. DOMESTIC WATER PIPING SPECIALTIES WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
C. PREPARE TEST AND INSPECTION REPORTS.
3.4 ADJUSTING
A. SET FIELD-ADJUSTABLE FLOW SET POINTS OF BALANCING VALVES.
B. SET FIELD-ADJUSTABLE TEMPERATURE SET POINTS OF TEMPERATURE-ACTUATED, WATER MIXING VALVES.
END OF SECTION 221119

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TOWN OF SANBORNTON · GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

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REVISIONS

SHEET TITLE:
SPECIFICATIONS

P5.4

SPECIFICATIONS P5.4

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SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS.
2. COPPER TUBE AND FITTINGS.
3. PVC PIPE AND FITTINGS
4. SPECIALTY PIPE FITTINGS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. COMPONENTS AND INSTALLATION SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING MINIMUM WORKING PRESSURE UNLESS OTHERWISE INDICATED:
1. SOIL, WASTE, AND VENT PIPING: 10-FOOT HEAD OF WATER.

2.2 PIPING MATERIALS

A. ALL CAST IRON SOIL PIPE AND FITTINGS SHALL BE MARKED WITH THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE (CISPI) AND LISTED BY NSF INTERNATIONAL.
B. COMPLY WITH REQUIREMENTS IN "PIPING SCHEDULE" ARTICLE FOR APPLICATIONS OF PIPE, TUBE, FITTING MATERIALS, AND JOINING METHODS FOR SPECIFIC SERVICES, SERVICE LOCATIONS, AND PIPE SIZES.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. PIPE AND FITTINGS: ALL CAST IRON DRAIN WASTE, VENT, SEWER AND STORM LINES SHALL BE CAST IRON SOIL PIPE AND FITTINGS CONFORMING TO THE REQUIREMENTS OF CISPI 301 OR ASTM A888. PIPE AND FITTINGS SHALL BE MARKED WITH THE COLLECTIVE TRADEMARK OF THE CAST IRON SOIL PIPE INSTITUTE AND BE LISTED BY NSF INTERNATIONAL. PIPE AND FITTINGS SHALL BE MANUFACTURED IN THE USA BY A MEMBR OF THE CAST IRON SOIL PPE INSTITUTE (CISPI)
1. EACH LENGTH OF PIPE AND EACH FITTING SHALL BE PLAINLY MARKED WITH SIZE, COUNTRY OF ORIGIN, AND NAME OF MANUFACTURER, OR MANUFACTURER'S REGISTERED TRADEMARK BY WHICH THE MANUFACTURER CAN BE READILY IDENTIFIED AFTER INSTALLATION.

B. CISPI, HUBLESS-PIPING COUPLINGS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   A. ANACO-HUSKY.
   B. CHARLOTTE PIPE AND FOUNDRY COMPANY.
   C. TYLER PIPE; A SUBSIDIARY OF MCWANE INC.
2. STANDARDS: SHALL CONFORM TO THE REQUIREMENTS OF CISPI 310 AND SHALL BE LISTED BY NSF INTERNATIONAL.
3. DESCRIPTION: STAINLESS-STEEL CORRUGATED SHIELD WITH STAINLESS-STEEL BANDS AND TIGHTENING DEVICES; AND ASTM C 564, RUBBER SLEEVE WITH INTEGRAL, CENTER PIPE STOP.

C. HEAVY-DUTY, HUBLESS-PIPING COUPLINGS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
   A. ANACO-HUSKY.
   B. CHARLOTTE PIPE AND FOUNDRY COMPANY.
   C. TYLER PIPE; A SUBSIDIARY OF MCWANE INC.
2. STANDARDS: SHALL CONFORM TO THE REQUIREMENTS OF ASTM C 1540.
3. DESCRIPTION: STAINLESS-STEEL SHIELD WITH STAINLESS-STEEL BANDS AND TIGHTENING DEVICES; AND ASTM C 564, RUBBER SLEEVE WITH INTEGRAL, CENTER PIPE STOP.

2.4 COPPER TUBE AND FITTINGS

A. COPPER TYPE DWV TUBE: ASTM B 306, DRAINAGE TUBE, DRAWN TEMPER.
B. COPPER DRAINAGE FITTINGS: ASME B16.23, CAST COPPER OR ASME B16.29, WROUGHT COPPER, SOLDER-JOINT FITTINGS.
C. HARD COPPER TUBE: ASTM B 88, TYPE L AND TYPE M, WATER TUBE, DRAWN TEMPER.
D. COPPER PRESSURE FITTINGS:
1. COPPER FITTINGS: ASME B16.18, CAST-COPPER-ALLOY OR ASME B16.22, WROUGHT-COPPER, SOLDER-JOINT FITTINGS. FURNISH WROUGHT-COPPER FITTINGS IF INDICATED.
E. COPPER FLANGES: ASME B16.24, CLASS 150, CAST COPPER WITH SOLDER-JOINT END.
1. FLANGE GASKET MATERIALS: ASME B16.21, FULL-FACE, FLAT, NONMETALLIC, ASBESTOS-FREE, 1/8-INCH MAXIMUM THICKNESS UNLESS THICKNESS OR SPECIFIC MATERIAL IS INDICATED.
2. FLANGE BOLTS AND NUTS: ASME B18.2.1, CARBON STEEL UNLESS OTHERWISE INDICATED.
F. SOLDER: ASTM B 32, LEAD FREE WITH ASTM B 813, WATER-FLUSHABLE FLUX.

2.5 PVC PIPE AND FITTINGS

A. COMPLY WITH NSF 14, "PLASTICS PIPING SYSTEMS COMPONENTS AND RELATED MATERIALS," FOR PLASTIC PIPING COMPONENTS. INCLUDE MARKING WITH "NSF-DWV" FOR PLASTIC DRAIN, WASTE, AND VENT PIPING AND "NSF-SEWER" FOR PLASTIC SEWER PIPING.
B. SOLID-WALL PVC PIPE: ASTM D 2665, DRAIN, WASTE, AND VENT.
C. CELLULAR-CORE PVC PIPE: ASTM F 891, SCHEDULE 40 **WILL NOT BE ACCEPTED**.
D. PVC SOCKET FITTINGS: ASTM D 2665, MADE TO ASTM D 3311, DRAIN, WASTE, AND VENT PATTERNS.
E. PVC PRESSURE FITTINGS: ASTM D 2466, SOCKET TYPE
F. PRIMER: ASTM F 656.
1. PRIMER SHALL HAVE A VOC CONTENT OF 550G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24)
2. ADHESIVE PRIMER SHALL COMPLY WITH THE TESTING AND PRODUCT REQUIREMENTS OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES "STANDARD PRACTICE FOR THE TESTING OF VOLATILE ORGANIC EMISSIONS FROM VARIOUS SOURCES USING SMALL-SCALE ENVIRONMENTAL CHAMBERS"
G. SOLVENT CEMENT: ASTM D 2564.
1. PVC SOLVENT CEMENT SHALL HAVE A VOC CONTENT OF 510 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24)
2. SOLVENT CEMENT SHALL COMPLY WITH THE TESTING AND PRODUCT REQUIREMENTS OF THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES "STANDARD PRACTICE FOR THE TESTING OF VOLATILE ORGANIC EMISSIONS FROM VARIOUS SOURCES USING SMALL-SCALE ENVIRONMENTAL CHAMBERS

2.6 SPECIALTY PIPE FITTINGS

A. TRANSITION COUPLINGS:
1. FITTING-TYPE TRANSITION COUPLINGS: MANUFACTURED PIPING COUPLING OR SPECIFIED PIPING SYSTEM FITTING.
2. SHIELDED, NONPRESSURE TRANSITION COUPLINGS:
   A. STANDARD: ASTM C 1460.
   B. DESCRIPTION: ELASTOMERIC OR RUBBER SLEEVE WITH FULL-LENGTH, CORROSION-RESISTANT OUTER SHIELD AND CORROSION-RESISTANT-METAL TENSION BAND AND TIGHTENING MECHANISM ON EACH END.
   C. END CONNECTIONS: SAME SIZE AS AND COMPATIBLE WITH PIPES TO BE JOINED.
3. PRESSURE TRANSITION COUPLINGS:
   A. STANDARD: AWWA C219.
   B. DESCRIPTION: METAL, SLEEVE-TYPE SAME SIZE AS, WITH PRESSURE RATING AT LEAST EQUAL TO, AND ENDS COMPATIBLE WITH, PIPES TO BE JOINED.
   C. CENTER-SLEEVE MATERIAL: MANUFACTURER'S STANDARD.
   D. GASKET MATERIAL: NATURAL OR SYNTHETIC RUBBER.
   E. METAL COMPONENT FINISH: CORROSION-RESISTANT COATING OR MATERIAL.

B. DIELECTRIC FITTINGS:
1. DIELECTRIC UNIONS:
   A. DESCRIPTION:
   1) STANDARD: ASSE 1079.
   2) PRESSURE RATING: 125 PSIG MINIMUM AT 180 DEG F.
   3) END CONNECTIONS: SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS.
2. DIELECTRIC FLANGES:
   A. DESCRIPTION:
   1) STANDARD: ASSE 1079.
   2) FACTORY-FABRICATED, BOLTED, COMPANION-FLANGE ASSEMBLY.
   3) PRESSURE RATING: 125 PSIG MINIMUM AT 180 DEG F.
   4) END CONNECTIONS: SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS; THREADED SOLDER-JOINT COPPER ALLOY AND THREADED FERROUS.
3. DIELECTRIC-FLANGE INSULATING KITS:
   A. DESCRIPTION:
   1) NONCONDUCTING MATERIALS FOR FIELD ASSEMBLY OF COMPANION FLANGES.
   2) PRESSURE RATING: 150 PSIG.
   3) GASKET: NEOPRENE OR PHENOLIC.
   4) BOLT SLEEVES: PHENOLIC OR POLYETHYLENE.
   5) WASHERS: PHENOLIC WITH STEEL BACKING WASHERS.
4. DIELECTRIC NIPPLES:
   A. DESCRIPTION:
   1) STANDARD: IAPMO PS 66.
   2) ELECTROPLATED STEEL NIPPLE.
   3) PRESSURE RATING: 300 PSIG AT 225 DEG F.
   4) END CONNECTIONS: MALE THREADED OR GROOVED.
   5) LINING: INERT AND NONCORROSIVE, PROPYLENE.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF PIPING SYSTEMS.
1. INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, PUMP SIZING, AND OTHER DESIGN CONSIDERATIONS.
2. INSTALL PIPING AS INDICATED UNLESS DEVIATIONS TO LAYOUT ARE APPROVED ON COORDINATION DRAWINGS.
B. INSTALL PIPING IN CONCEALED LOCATIONS UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
C. INSTALL PIPING INDICATED TO BE EXPOSED AND PIPING IN EQUIPMENT ROOMS AND SERVICE AREAS AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE.
D. INSTALL PIPING ABOVE ACCESSIBLE CEILINGS TO ALLOW SUFFICIENT SPACE FOR CEILING PANEL REMOVAL.
E. INSTALL PIPING TO PERMIT VALVE SERVICING.
F. INSTALL PIPING AT INDICATED SLOPES.
G. INSTALL PIPING FREE OF SAGS AND BENDS.
H. INSTALL FITTINGS FOR CHANGES IN DIRECTION AND BRANCH CONNECTIONS.
I. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.
J. MAKE CHANGES IN DIRECTION FOR SOIL AND WASTE DRAINAGE AND VENT PIPING USING APPROPRIATE BRANCHES, BENDS, AND LONG-SWEEP BENDS.
1. SANITARY TEES AND SHORT-SWEEP 1/4 BENDS MAY BE USED ON VERTICAL STACKS IF CHANGE IN DIRECTION OF FLOW IS FROM HORIZONTAL TO VERTICAL.
2. USE LONG-TURN, DOUBLE Y-BRANCH AND 1/8-BEND FITTINGS IF TWO FIXTURES ARE INSTALLED BACK TO BACK OR SIDE BY SIDE WITH COMMON DRAIN PIPE.
   A. STRAIGHT TEES, ELBOWS, AND CROSSES MAY BE USED ON VENT LINES.
3. DO NOT CHANGE DIRECTION OF FLOW MORE THAN 90 DEGREES.
4. USE PROPER SIZE OF STANDARD INCREASERS AND REDUCERS IF PIPES OF DIFFERENT SIZES ARE CONNECTED.
   A. REDUCING SIZE OF WASTE PIPING IN DIRECTION OF FLOW IS PROHIBITED.
K. LAY BURIED BUILDING WASTE PIPING BEGINNING AT LOW POINT OF EACH SYSTEM.
1. INSTALL TRUE TO GRADES AND ALIGNMENT INDICATED, WITH UNBROKEN CONTINUITY OF INVERT. PLACE HUB ENDS OF PIPING UPSTREAM.
2. INSTALL REQUIRED GASKETS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR USE OF LUBRICANTS, CEMENTS, AND OTHER INSTALLATION REQUIREMENTS.
3. MAINTAIN SWAB IN PIPING AND PULL PAST EACH JOINT AS COMPLETED.
L. INSTALL SOIL AND WASTE AND VENT PIPING AT THE FOLLOWING MINIMUM SLOPES UNLESS OTHERWISE INDICATED:
1. BUILDING SANITARY WASTE: 2 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 3 AND SMALLER; 1 PERCENT DOWNWARD IN DIRECTION OF FLOW FOR PIPING NPS 4 AND LARGER.
2. VENT PIPING: 1 PERCENT DOWN TOWARD VERTICAL FIXTURE VENT OR TOWARD VENT STACK.
M. INSTALL CAST-IRON SOIL PIPING ACCORDING TO CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK," CHAPTER IV, "INSTALLATION OF CAST IRON SOIL PIPE AND FITTINGS."
N. INSTALL JOINTS FOR PIPE AND FITTINGS ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND LOCAL CODE REQUIREMENTS.
O. INSTALL STEEL PIPING ACCORDING TO APPLICABLE PLUMBING CODE.
P. INSTALL STAINLESS-STEEL PIPING ACCORDING TO ASME A112.3.1 AND APPLICABLE PLUMBING CODE.
Q. INSTALL ABOVEGROUND COPPER TUBING ACCORDING TO CDA'S "COPPER TUBE HANDBOOK."
R. INSTALL ENGINEERED SOIL AND WASTE AND VENT PIPING SYSTEMS AS FOLLOWS:
1. COMBINATION WASTE AND VENT: COMPLY WITH STANDARDS OF AUTHORITIES HAVING JURISDICTION.
2. REDUCED-SIZE VENTING: COMPLY WITH STANDARDS OF AUTHORITIES HAVING JURISDICTION.
S. PLUMBING SPECIALTIES:
1. INSTALL CLEANOUTS AT GRADE AND EXTEND TO WHERE BUILDING SANITARY DRAINS CONNECT TO BUILDING SANITARY SEWERS IN SANITARY WASTE GRAVITY-FLOW PIPING.
   A. INSTALL CLEANOUT FITTING WITH CLOSURE PLUG INSIDE THE BUILDING IN SANITARY DRAINAGE FORCE-MAIN PIPING.
   B. COMPLY WITH REQUIREMENTS FOR CLEANOUTS SPECIFIED IN SECTION 221319 "SANITARY WASTE PIPING SPECIALTIES."
2. INSTALL DRAINS IN SANITARY WASTE GRAVITY-FLOW PIPING.
   A. COMPLY WITH REQUIREMENTS FOR DRAINS SPECIFIED IN SECTION 221319 "SANITARY WASTE PIPING SPECIALTIES."
T. DO NOT ENCLOSE, COVER, OR PUT PIPING INTO OPERATION UNTIL IT IS INSPECTED AND APPROVED BY AUTHORITIES HAVING JURISDICTION.
U. INSTALL SLEEVES FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
1. COMPLY WITH REQUIREMENTS FOR SLEEVES SPECIFIED IN SECTION 220517 "SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING."
V. INSTALL SLEEVE SEALS FOR PIPING PENETRATIONS OF CONCRETE WALLS AND SLABS.
1. COMPLY WITH REQUIREMENTS FOR SLEEVE SEALS SPECIFIED IN SECTION 220517 "SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING."
W. INSTALL ESCUTCHEONS FOR PIPING PENETRATIONS OF WALLS, CEILINGS, AND FLOORS.
1. COMPLY WITH REQUIREMENTS FOR ESCUTCHEONS SPECIFIED IN SECTION 220518 "ESCUTCHEONS FOR PLUMBING PIPING."

3.2 JOINT CONSTRUCTION

A. JOIN HUBLESS, CAST-IRON SOIL PIPING ACCORDING TO CISPI 310 AND CISPI'S "CAST IRON SOIL PIPE AND FITTINGS HANDBOOK" FOR HUBLESS-PIPING COUPLING JOINTS.
B. JOIN COPPER TUBE AND FITTINGS WITH SOLDERED JOINTS ACCORDING TO ASTM B 828. USE ASTM B 813, WATER-FLUSHABLE, LEAD-FREE FLUX AND ASTM B 32, LEAD-FREE-ALLOY SOLDER.

3.3 SPECIALTY PIPE FITTING INSTALLATION

A. TRANSITION COUPLINGS:
1. INSTALL TRANSITION COUPLINGS AT JOINTS OF PIPING WITH SMALL DIFFERENCES IN ODS.
2. IN WASTE DRAINAGE PIPING: SHIELDED, NONPRESSURE TRANSITION COUPLINGS.
B. DIELECTRIC FITTINGS:
1. INSTALL DIELECTRIC FITTINGS IN PIPING AT CONNECTIONS OF DISSIMILAR METAL PIPING AND TUBING.
2. DIELECTRIC FITTINGS FOR NPS 2 AND SMALLER: USE DIELECTRIC NIPPLES.
3. DIELECTRIC FITTINGS FOR NPS 2-1/2 TO NPS 4: USE DIELECTRIC FLANGES.
4. DIELECTRIC FITTINGS FOR NPS 5 AND LARGER: USE DIELECTRIC FLANGE KITS.

3.4 HANGER AND SUPPORT INSTALLATION

A. COMPLY WITH REQUIREMENTS FOR PIPE HANGER AND SUPPORT DEVICES AND INSTALLATION SPECIFIED IN SECTION 220529 "HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT."
1. INSTALL CARBON-STEEL PIPE HANGERS FOR HORIZONTAL PIPING IN NONCORROSIVE ENVIRONMENTS.
2. INSTALL CARBON-STEEL PIPE SUPPORT CLAMPS FOR VERTICAL PIPING IN NONCORROSIVE ENVIRONMENTS.
3. VERTICAL PIPING: MSS TYPE 8 OR TYPE 42, CLAMPS.
4. INSTALL INDIVIDUAL, STRAIGHT, HORIZONTAL PIPING RUNS:
   A. 100 FEET AND LESS: MSS TYPE 1, ADJUSTABLE, STEEL CLEVIS HANGERS.
   B. LONGER THAN 100 FEET: MSS TYPE 43, ADJUSTABLE ROLLER HANGERS.
   C. LONGER THAN 100 FEET IF INDICATED: MSS TYPE 49, SPRING CUSHION ROLLS.
5. MULTIPLE, STRAIGHT, HORIZONTAL PIPING RUNS 100 FEET OR LONGER: MSS TYPE 44, PIPE ROLLS. SUPPORT PIPE ROLLS ON TRAPEZE.
6. BASE OF VERTICAL PIPING: MSS TYPE 52, SPRING HANGERS.
B. SUPPORT HORIZONTAL PIPING AND TUBING WITHIN 12 INCHES OF EACH FITTING AND COUPLING.
C. SUPPORT VERTICAL PIPING AND TUBING AT BASE AND AT EACH FLOOR.
D. ROD DIAMETER MAY BE REDUCED ONE SIZE FOR DOUBLE-ROD HANGERS, WITH 3/8-INCH MINIMUM RODS.
E. INSTALL HANGERS FOR CAST-IRON SOIL PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
1. NPS 1-1/2 AND NPS 2: 60 INCHES WITH 3/8-INCH ROD.
2. NPS 3: 60 INCHES WITH 1/2-INCH ROD.
3. NPS 4 AND NPS 5: 60 INCHES WITH 5/8-INCH ROD.
F. INSTALL SUPPORTS FOR VERTICAL CAST-IRON SOIL PIPING EVERY 15 FEET.
G. INSTALL HANGERS FOR COPPER TUBING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
1. NPS 1-1/4: 72 INCHES WITH 3/8-INCH ROD.
2. NPS 1-1/2 AND NPS 2: 96 INCHES WITH 3/8-INCH ROD.
3. NPS 2-1/2: 108 INCHES WITH 1/2-INCH ROD.
4. NPS 3 AND NPS 5: 10 FEET WITH 1/2-INCH ROD.
H. INSTALL SUPPORTS FOR VERTICAL COPPER TUBING EVERY 10 FEET.
I. INSTALL HANGERS FOR PVC WASTE PIPING WITH THE FOLLOWING MAXIMUM HORIZONTAL SPACING AND MINIMUM ROD DIAMETERS:
1. NPS 1-1/2 AND NPS 2: 48 INCHES WITH 3/8-INCH ROD.
2. NPS 3: 48 INCHES WITH 1/2-INCH ROD.
3. NPS 4 AND NPS 5: 48 INCHES WITH 5/8-INCH ROD.
4. NPS 6 AND NPS 8: 48 INCHES WITH 3/4-INCH ROD.
5. NPS 10 AND NPS 12: 48 INCHES WITH 7/8-INCH ROD.
J. INSTALL SUPPORTS FOR VERTICAL SPECIAL WASTE PIPING EVERY 48 INCHES.
K. SUPPORT PIPING AND TUBING NOT LISTED ABOVE ACCORDING TO MSS SP-58 AND MANUFACTURER'S WRITTEN INSTRUCTIONS.

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3.5 CONNECTIONS

A. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.
B. CONNECT SOIL AND WASTE PIPING TO EXTERIOR SANITARY SEWERAGE PIPING. USE TRANSITION FITTING TO JOIN DISSIMILAR PIPING MATERIALS.
C. CONNECT WASTE AND VENT PIPING TO THE FOLLOWING:
1. PLUMBING FIXTURES: CONNECT WASTE PIPING IN SIZES INDICATED, BUT NOT SMALLER THAN REQUIRED BY PLUMBING CODE.
2. PLUMBING FIXTURES AND EQUIPMENT: CONNECT ATMOSPHERIC VENT PIPING IN SIZES INDICATED, BUT NOT SMALLER THAN REQUIRED BY AUTHORITIES HAVING JURISDICTION.
3. PLUMBING SPECIALTIES: CONNECT WASTE AND VENT PIPING IN SIZES INDICATED, BUT NOT SMALLER THAN REQUIRED BY PLUMBING CODE.
4. INSTALL TEST TEES (WALL CLEANOUTS) IN CONDUCTORS NEAR FLOOR AND FLOOR CLEANOUTS WITH COVER FLUSH WITH FLOOR.
5. COMPLY WITH REQUIREMENTS FOR CLEANOUTS AND DRAINS SPECIFIED IN SECTION 221319 "SANITARY WASTE PIPING SPECIALTIES."
D. WHERE INSTALLING PIPING ADJACENT TO EQUIPMENT, ALLOW SPACE FOR SERVICE AND MAINTENANCE OF EQUIPMENT.
E. MAKE CONNECTIONS ACCORDING TO THE FOLLOWING UNLESS OTHERWISE INDICATED:
1. INSTALL UNIONS, IN PIPING NPS 2 AND SMALLER, ADJACENT TO EACH VALVE AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.
2. INSTALL FLANGES, IN PIPING NPS 2-1/2 AND LARGER, ADJACENT TO FLANGED VALVES AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.

3.6 FIELD QUALITY CONTROL

A. DURING INSTALLATION, NOTIFY AUTHORITIES HAVING JURISDICTION AT LEAST 24 HOURS BEFORE INSPECTION MUST BE MADE. PERFORM TESTS SPECIFIED BELOW IN PRESENCE OF AUTHORITIES HAVING JURISDICTION.
1. ROUGHING-IN INSPECTION: ARRANGE FOR INSPECTION OF PIPING BEFORE CONCEALING OR CLOSING-IN AFTER ROUGHING-IN AND BEFORE SETTING FIXTURES.
2. FINAL INSPECTION: ARRANGE FOR FINAL INSPECTION BY AUTHORITIES HAVING JURISDICTION TO OBSERVE TESTS SPECIFIED BELOW AND TO ENSURE COMPLIANCE WITH REQUIREMENTS.
B. REINSPECTION: IF AUTHORITIES HAVING JURISDICTION FIND THAT PIPING WILL NOT PASS TEST OR INSPECTION, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION.
C. REPORTS: PREPARE INSPECTION REPORTS AND HAVE THEM SIGNED BY AUTHORITIES HAVING JURISDICTION.
D. TEST SANITARY WASTE AND VENT PIPING ACCORDING TO PROCEDURES OF AUTHORITIES HAVING JURISDICTION OR, IN ABSENCE OF PUBLISHED PROCEDURES, AS FOLLOWS:
1. TEST FOR LEAKS AND DEFECTS IN NEW PIPING AND PARTS OF EXISTING PIPING THAT HAVE BEEN ALTERED, EXTENDED, OR REPAIRED.
   A. IF TESTING IS PERFORMED IN SEGMENTS, SUBMIT SEPARATE REPORT FOR EACH TEST, COMPLETE WITH DIAGRAM OF PORTION OF PIPING TESTED.
2. LEAVE UNCOVERED AND UNCONCEALED NEW, ALTERED, EXTENDED, OR REPLACED WASTE AND VENT PIPING UNTIL IT HAS BEEN TESTED AND APPROVED.
   A. EXPOSE WORK THAT WAS COVERED OR CONCEALED BEFORE IT WAS TESTED.
3. ROUGHING-IN PLUMBING TEST PROCEDURE: TEST WASTE AND VENT PIPING EXCEPT OUTSIDE LEADERS ON COMPLETION OF ROUGHING-IN.
   A. CLOSE OPENINGS IN PIPING SYSTEM AND FILL WITH WATER TO POINT OF OVERFLOW, BUT NOT LESS THAN 10-FOOT HEAD OF WATER.
   B. FROM 15 MINUTES BEFORE INSPECTION STARTS TO COMPLETION OF INSPECTION, WATER LEVEL MUST NOT DROP.
   C. INSPECT JOINTS FOR LEAKS.
4. FINISHED PLUMBING TEST PROCEDURE: AFTER PLUMBING FIXTURES HAVE BEEN SET AND TRAPS FILLED WITH WATER, TEST CONNECTIONS AND PROVE THEY ARE GASTIGHT AND WATERTIGHT.
   A. PLUG VENT-STACK OPENINGS ON ROOF AND BUILDING DRAINS WHERE THEY LEAVE BUILDING. INTRODUCE AIR INTO PIPING SYSTEM EQUAL TO PRESSURE OF 1-INCH WG.
   B. USE U-TUBE OR MANOMETER INSERTED IN TRAP OF WATER CLOSET TO MEASURE THIS PRESSURE.
   C. AIR PRESSURE MUST REMAIN CONSTANT WITHOUT INTRODUCING ADDITIONAL AIR THROUGHOUT PERIOD OF INSPECTION.
   D. INSPECT PLUMBING FIXTURE CONNECTIONS FOR GAS AND WATER LEAKS.
5. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING, OR PORTION THEREOF, UNTIL SATISFACTORY RESULTS ARE OBTAINED.
6. PREPARE REPORTS FOR TESTS AND REQUIRED CORRECTIVE ACTION.

3.7 PIPING SCHEDULE

A. FLANGES AND UNIONS MAY BE USED ON ABOVEGROUND PRESSURE PIPING UNLESS OTHERWISE INDICATED.
B. ABOVEGROUND OR BELOW GROUND, SOIL, WASTE AND VENT PIPING NPS 6 AND SMALLER SHALL BE ANY OF THE FOLLOWING:
1. SOLID WALL PVC PIPE, PVC SOCKET FITTINGS, AND SOLVENT-CEMENTED JOINTS
2. HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS; CISPI OR HEAVY-DUTY HUBLESS-PIPING COUPLINGS; AND COUPLED JOINTS.
3. COPPER TYPE DWV TUBE, COPPER DRAINAGE FITTINGS, AND SOLDERED JOINTS.
4. DISSIMILAR PIPE-MATERIAL COUPLINGS: SHIELDED, NONPRESSURE TRANSITION COUPLINGS.

END OF SECTION 221316

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP
STATE OF NEW HAMPSHIRE - THOMAS W. BETTERIDGE No. 13988 LICENSED - PROFESSIONAL ENGINEER
10/20/2021

REVISIONS

SHEET TITLE:
SPECIFICATIONS

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SPECIFICATIONS P5.5

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SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. CLEANOUTS.
2. FLOOR DRAINS.
3. ROOF FLASHING ASSEMBLIES.
4. MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES.
5. FLASHING MATERIALS.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED. INCLUDE RATED CAPACITIES, OPERATING CHARACTERISTICS, AND ACCESSORIES FOR GREASE INTERCEPTORS.

1.3 QUALITY ASSURANCE

A. DRAINAGE PIPING SPECIALTIES SHALL BEAR LABEL, STAMP, OR OTHER MARKINGS OF SPECIFIED TESTING AGENCY.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. METAL FLOOR CLEANOUTS:
1. ASME A112.36.2M, CAST-IRON CLEANOUTS:
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1) JOSAM COMPANY.
2) SIOUX CHIEF MANUFACTURING CO., INC.
3) SMITH, JAY R. MFG. CO.
4) TYLER PIPE.
5) WATTS DRAINAGE PRODUCTS.
2. STANDARD: ASME A112.36.2M FOR ADJUSTABLE HOUSING CAST-IRON SOIL PIPE WITH CAST-IRON FERRULE CLEANOUT.
3. SIZE: SAME AS CONNECTED BRANCH.
4. TYPE: ADJUSTABLE HOUSING CAST-IRON SOIL PIPE WITH CAST-IRON FERRULE.
5. BODY OR FERRULE: CAST IRON.
6. CLAMPING DEVICE: REQUIRED.
7. CLOSURE: BRASS PLUG WITH STRAIGHT THREADS AND GASKET.
8. ADJUSTABLE HOUSING MATERIAL: CAST IRON WITH THREADS.
9. FRAME AND COVER MATERIAL AND FINISH: STAINLESS STEEL.
10. FRAME AND COVER SHAPE: ROUND.
11. TOP LOADING CLASSIFICATION: HEAVY DUTY.
12. RISER: ASTM A74, SERVICE CLASS, CAST-IRON DRAINAGE PIPE FITTING AND RISER TO CLEANOUT.
13. STANDARD: ASME A112.3.1.
14. SIZE: SAME AS CONNECTED BRANCH.

B. CAST-IRON WALL CLEANOUTS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. JOSAM COMPANY; JOSAM DIV.
B. SMITH, JAY R. MFG. CO.
C. TYLER PIPE; WADE DIV.
D. WATTS DRAINAGE PRODUCTS.
E. ZURN PLUMBING PRODUCTS GROUP; SPECIFICATION DRAINAGE OPERATION.
2. STANDARD: ASME A112.36.2M. INCLUDE WALL ACCESS.
3. SIZE: SAME AS CONNECTED DRAINAGE PIPING.
4. BODY: HUBLESS, CAST-IRON SOIL PIPE TEST TEE AS REQUIRED TO MATCH CONNECTED PIPING.
5. CLOSURE: COUNTERSUNK, BRASS PLUG.
6. CLOSURE PLUG SIZE: SAME AS OR NOT MORE THAN ONE SIZE SMALLER THAN CLEANOUT SIZE.
7. WALL ACCESS: ROUND, DEEP, CHROME-PLATED BRONZE COVER PLATE WITH SCREW.

2.2 FLOOR DRAINS

A. CAST-IRON FLOOR DRAINS:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
A. JOSAM COMPANY; JOSAM DIV.
B. MIFAB INC.
C. SMITH, JAY R. MFG. CO.
D. WATTS DRAINAGE PRODUCTS.
E. ZURN PLUMBING PRODUCTS GROUP.
2. STANDARD: ASME A112.6.3. PATTERN: FLOOR DRAIN.
3. BODY MATERIAL: GRAY IRON.
4. SEEPAGE FLANGE: REQUIRED.
5. ANCHOR FLANGE: REQUIRED.
6. CLAMPING DEVICE: REQUIRED, REVERSIBLE WITH WEEPHOLES.
7. OUTLET: BOTTOM. 3-INCH (76-MM) PIPE SIZE, UNLESS OTHERWISE INDICATED ON DRAWINGS.
8. COATING ON INTERIOR AND EXPOSED EXTERIOR SURFACES: ACID-RESISTANT ENAMEL.
9. TOP OF BODY AND STRAINER FINISH: NICKEL BRONZE.
10. TOP SHAPE: ROUND. NOMINAL 7 INCH (178 MM) DIAMETER STRAINER.

2.3 FLOOR DRAIN TRAP SEAL PROTECTION DEVICES

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. SURE SEAL MFG. – SURESEAL INLINE FLOOR DRAIN TRAP SEALER.
2. PROVENT SYSTEMS INC. – PROSET TRAP GUARD.
3. MIFAB INC. – MI-GARD SERIES FLOOR DRAIN TRAP SEAL.

B. STANDARDS: ASSE 1072. IAPMO LISTED, OR ICC-ES LISTED.

C. COMPATIBILITY: MANUFACTURER SHALL VERIFY COMPATIBILITY WITH THE FLOOR DRAIN OR OTHER DEVICE BEING PROTECTED. VERIFY COMPATIBILITY WITH THE FLOORING TYPE; FOR EXAMPLE, SOME DEVICES ARE NOT LISTED FOR USE IN WOOD FLOORING. VERIFY COMPATIBILITY WITH THE FLOWING FLUID; FOR EXAMPLE, SOME DEVICES ARE NOT LISTED FOR USE WITH GREASY WASTE WATER.

D. BODY: PLASTIC OR RUBBER, WITH OUTER SEAL TO INTERIOR OF DRAIN BODY.

E. CLOSURE: HINGED RIGID PLASTIC ELEMENTS WITH EDGE GASKETS, RUBBER SEALING FLAPPER WHICH SEATS AGAINST BODY OPENING, OR DUCKBILL STYLE ELASTOMERIC TUBE.

F. SEALING ELEMENT: SOFT GASKET OF EPDM OR SILICON RUBBER, OR OTHER DURABLE ELASTOMERIC MATERIAL.

G. SEAL OF BODY TO DRAIN: SOFT GASKET OF EPDM OR SILICON RUBBER.
1. OPERATION: DEVICE INSTALLS AT OUTLET OF DRAIN BODY, UPSTREAM OF AND ABOVE THE WATER-SEAL TRAP. DEVICE IS FRICTION-FIT INTO DRAIN, AND IS REMOVABLE AND REPLACEABLE. NORMALLY-CLOSED SEALING ELEMENT CLOSES UNDER NO-FLOW CONDITION, TO BLOCK EVAPORATION OF WATER IN DRAIN TRAP.

2.4 ROOF FLASHING ASSEMBLIES

A. ROOF FLASHING ASSEMBLIES:
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
A. ACORN ENGINEERING COMPANY; ELMDOR/STONEMAN DIV.
B. THALER METAL INDUSTRIES LTD.
2. DESCRIPTION: MANUFACTURED ASSEMBLY MADE OF 4.0-LB/SQ. FT., 0.0625-INCH - THICK, LEAD FLASHING COLLAR AND SKIRT EXTENDING AT LEAST 6 INCHES FROM PIPE, WITH GALVANIZED-STEEL BOOT REINFORCEMENT AND COUNTERFLASHING FITTING.
A. OPEN-TOP VENT CAP: WITHOUT CAP.

2.5 FLASHING MATERIALS

A. LEAD SHEET: ASTM B 749, TYPE L51121, COPPER BEARING, WITH THE FOLLOWING MINIMUM WEIGHTS AND THICKNESSES, UNLESS OTHERWISE INDICATED:
1. GENERAL USE: 4.0-LB/SQ. FT. (20-KG/SQ. M), 0.0625-INCH (1.6-MM) THICKNESS.
2. VENT PIPE FLASHING: 3.0-LB/SQ. FT. (15-KG/SQ. M), 0.0469-INCH (1.2-MM) THICKNESS.
3. BURNING: 6-LB/SQ. FT. (30-KG/SQ. M), 0.0938-INCH (2.4-MM) THICKNESS.

B. FASTENERS: METAL COMPATIBLE WITH MATERIAL AND SUBSTRATE BEING FASTENED.

C. METAL ACCESSORIES: SHEET METAL STRIPS, CLAMPS, ANCHORING DEVICES, AND SIMILAR ACCESSORY UNITS REQUIRED FOR INSTALLATION; MATCHING OR COMPATIBLE WITH MATERIAL BEING INSTALLED.

D. SOLDER: ASTM B 32, LEAD-FREE ALLOY.

E. BITUMINOUS COATING: SSPC-PAINT 12, SOLVENT-TYPE, BITUMINOUS MASTIC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. INSTALL CLEANOUTS IN ABOVEGROUND PIPING AND BUILDING DRAIN PIPING ACCORDING TO THE FOLLOWING, UNLESS OTHERWISE INDICATED:
1. SIZE SAME AS DRAINAGE PIPING UP TO NPS 4. USE NPS 4 FOR LARGER DRAINAGE PIPING UNLESS LARGER CLEANOUT IS INDICATED.
2. LOCATE AT EACH CHANGE IN DIRECTION OF PIPING GREATER THAN 45 DEGREES.
3. LOCATE AT MINIMUM INTERVALS OF 50 FEET FOR PIPING NPS 4 AND SMALLER AND 100 FEET FOR LARGER PIPING.

B. FOR FLOOR CLEANOUTS FOR PIPING BELOW FLOORS, INSTALL CLEANOUT DECK PLATES WITH ADJUSTABLE TOP FLUSH WITH FINISHED FLOOR.

C. FOR CLEANOUTS LOCATED IN CONCEALED PIPING, INSTALL CLEANOUT WALL ACCESS COVERS, OF TYPES INDICATED, WITH FRAME AND COVER FLUSH WITH FINISHED WALL.

D. INSTALL FLOOR DRAINS AT LOW POINTS OF SURFACE AREAS TO BE DRAINED. SET GRATES OF DRAINS FLUSH WITH FINISHED FLOOR, UNLESS OTHERWISE INDICATED.
1. POSITION FLOOR DRAINS FOR EASY ACCESS AND MAINTENANCE.
2. SET FLOOR DRAINS BELOW ELEVATION OF SURROUNDING FINISHED FLOOR TO ALLOW FLOOR DRAINAGE. SET WITH GRATES DEPRESSED ACCORDING TO THE FOLLOWING DRAINAGE AREA RADII:
A. RADIUS, 30 INCHES OR LESS: EQUIVALENT TO 1 PERCENT SLOPE, BUT NOT LESS THAN 1/4-INCH TOTAL DEPRESSION.
B. RADIUS, 30 TO 60 INCHES: EQUIVALENT TO 1 PERCENT SLOPE.
C. RADIUS, 60 INCHES OR LARGER: EQUIVALENT TO 1 PERCENT SLOPE, BUT NOT GREATER THAN 1-INCH TOTAL DEPRESSION.
3. INSTALL FLOOR-DRAIN FLASHING COLLAR OR FLANGE SO NO LEAKAGE OCCURS BETWEEN DRAIN AND ADJOINING FLOORING. MAINTAIN INTEGRITY OF WATERPROOF MEMBRANES WHERE PENETRATED.
4. INSTALL INDIVIDUAL TRAPS FOR FLOOR DRAINS CONNECTED TO SANITARY BUILDING DRAIN, UNLESS OTHERWISE INDICATED.
5. PROVIDE TRAP SEAL PROTECTION DEVICES IN FLOOR DRAINS AND SIMILAR FIXTURES.

E. INSTALL ROOF FLASHING ASSEMBLIES ON SANITARY STACK VENTS AND VENT STACKS THAT EXTEND THROUGH ROOF.

F. INSTALL FLASHING FITTINGS ON SANITARY STACK VENTS AND VENT STACKS THAT EXTEND THROUGH ROOF.

G. INSTALL FLOOR-DRAIN, TRAP-SEAL DEVICES IN THE OUTLET CONNECTIONS OF FLOOR DRAINS, HOPPER DRAINS, AND SIMILAR DEVICES.

H. INSTALL AIR-GAP FITTINGS ON DRAINING-TYPE BACKFLOW PREVENTERS AND ON INDIRECT-WASTE PIPING DISCHARGE INTO SANITARY DRAINAGE SYSTEM.

I. INSTALL SLEEVE FLASHING DEVICE WITH EACH RISER AND STACK PASSING THROUGH FLOORS WITH WATERPROOF MEMBRANE.

J. INSTALL TRAPS ON PLUMBING SPECIALTY DRAIN OUTLETS. OMIT TRAPS ON INDIRECT WASTES UNLESS TRAP IS INDICATED.

3.2 CONNECTIONS

A. COMPLY WITH REQUIREMENTS IN SECTION 221316 "SANITARY WASTE AND VENT PIPING" FOR PIPING INSTALLATION REQUIREMENTS. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.

B. INSTALL PIPING ADJACENT TO EQUIPMENT TO ALLOW SERVICE AND MAINTENANCE.

3.3 FLASHING INSTALLATION

A. FABRICATE FLASHING FROM SINGLE PIECE UNLESS LARGE PANS, SUMPS, OR OTHER DRAINAGE SHAPES ARE REQUIRED. JOIN FLASHING ACCORDING TO THE FOLLOWING IF REQUIRED:
1. LEAD SHEETS: BURN JOINTS OF LEAD SHEETS 6.0-LB/SQ. FT. (30-KG/SQ. M), 0.0938-INCH (2.4-MM) THICKNESS OR THICKER. SOLDER JOINTS OF LEAD SHEETS 4.0-LB/SQ. FT. (20-KG/SQ. M), 0.0625-INCH (1.6-MM) THICKNESS OR THINNER.

B. INSTALL SHEET FLASHING ON PIPES, SLEEVES, AND SPECIALTIES PASSING THROUGH OR EMBEDDED IN FLOORS AND ROOFS WITH WATERPROOF MEMBRANE.
1. PIPE FLASHING: SLEEVE TYPE, MATCHING PIPE SIZE, WITH MINIMUM LENGTH OF 10 INCHES (250 MM), AND SKIRT OR FLANGE EXTENDING AT LEAST 8 INCHES (200 MM) AROUND PIPE.
2. SLEEVE FLASHING: FLAT SHEET, WITH SKIRT OR FLANGE EXTENDING AT LEAST 8 INCHES (200 MM) AROUND SLEEVE.
3. EMBEDDED SPECIALTY FLASHING: FLAT SHEET, WITH SKIRT OR FLANGE EXTENDING AT LEAST 8 INCHES (200 MM) AROUND SPECIALTY.

C. SET FLASHING ON FLOORS AND ROOFS IN SOLID COATING OF BITUMINOUS CEMENT.

D. SECURE FLASHING INTO SLEEVE AND SPECIALTY CLAMPING RING OR DEVICE.

E. INSTALL FLASHING FOR PIPING PASSING THROUGH ROOFS WITH COUNTERFLASHING OR COMMERCIALLY MADE FLASHING FITTINGS, ACCORDING TO SECTION 076200 "SHEET METAL FLASHING AND TRIM."

F. EXTEND FLASHING UP VENT PIPE PASSING THROUGH ROOFS AND TURN DOWN INTO PIPE, OR SECURE FLASHING INTO CAST-IRON SLEEVE HAVING CALKING RECESS.

3.4 PROTECTION

A. PROTECT DRAINS DURING REMAINDER OF CONSTRUCTION PERIOD TO AVOID CLOGGING WITH DIRT OR DEBRIS AND TO PREVENT DAMAGE FROM TRAFFIC OR CONSTRUCTION WORK.

B. PLACE PLUGS IN ENDS OF UNCOMPLETED PIPING AT END OF EACH DAY OR WHEN WORK STOPS.

END OF SECTION 221319

SECTION 223400 - DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
1. COMMERCIAL, DOMESTIC-WATER HEATERS.
2. DOMESTIC-WATER HEATER ACCESSORIES.

1.2 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE AND SIZE OF DOMESTIC-WATER HEATER INDICATED.

B. SHOP DRAWINGS:
1. WIRING DIAGRAMS: FOR POWER, SIGNAL, AND CONTROL WIRING.

1.3 WARRANTY

A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF FUEL-FIRED, DOMESTIC-WATER HEATERS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.
1. WARRANTY PERIODS: FROM DATE OF SUBSTANTIAL COMPLETION.
A. COMMERCIAL, DOMESTIC-WATER HEATERS:
1) STORAGE TANK: TEN YEARS.
2) CONTROLS AND OTHER COMPONENTS: TEN YEARS.
B. COMPRESSION TANKS: FIVE YEARS.

PART 2 - PRODUCTS

2.1 COMMERCIAL, STORAGE, DOMESTIC-WATER HEATERS

A. COMMERCIAL, HYBRID ELECTRIC, STORAGE, DOMESTIC-WATER HEATERS:
1. STANDARD: NSF/ANSI 372
2. FACTORY-INSTALLED STORAGE-TANK APPURTENANCES:
A. ANODE ROD: PREMIUM GRADE ANODE ROD WITH RESISTOR.
B. DIP TUBE: REQUIRED UNLESS COLD-WATER INLET IS NEAR BOTTOM OF TANK.
C. DRAIN VALVE: CORROSION-RESISTANT METAL COMPLYING WITH ASSE 1005.
D. INSULATION: COMPLY WITH ASHRAE/IESNA 90.1. SURROUND ENTIRE STORAGE TANK EXCEPT CONNECTIONS AND CONTROLS.
E. TEMPERATURE CONTROL: ADJUSTABLE THERMOSTAT.
F. SAFETY CONTROLS: WATER SENSOR DETECTS WATER OUTSIDE OF UNIT AND SENDS AN ALERT VIA THE UNIT CONTROLLER.
G. COMBINATION TEMPERATURE-AND-PRESSURE RELIEF VALVES: ANSI Z21.22/CSA 4.4-M. INCLUDE ONE OR MORE RELIEF VALVES WITH TOTAL RELIEVING CAPACITY AT LEAST AS GREAT AS HEAT INPUT, AND INCLUDE PRESSURE SETTING LESS THAN DOMESTIC-WATER HEATER WORKING-PRESSURE RATING. SELECT ONE RELIEF VALVE WITH SENSING ELEMENT THAT EXTENDS INTO STORAGE TANK.
H. HEAT PUMP WATER HEATER WITH ENERGY STAR LABEL AND MINIMUM OF 3.55 UEF. SEE DRAWINGS FOR ADDITIONAL REQUIREMENTS AND INFORMATION.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. DOMESTIC-WATER COMPRESSION TANKS:
1. DESCRIPTION: STEEL, PRESSURE-RATED TANK CONSTRUCTED WITH WELDED JOINTS AND FACTORY-INSTALLED BUTYL-RUBBER DIAPHRAGM. INCLUDE AIR PRECHARGE TO MINIMUM SYSTEM-OPERATING PRESSURE AT TANK.
2. CONSTRUCTION:
A. TAPPINGS: FACTORY-FABRICATED STEEL, WELDED TO TANK BEFORE TESTING AND LABELING. INCLUDE ASME B1.20.1 PIPE THREAD.
B. INTERIOR FINISH: COMPLY WITH NSF 61 ANNEX G BARRIER MATERIALS FOR POTABLE-WATER TANK LININGS, INCLUDING EXTENDING FINISH INTO AND THROUGH TANK FITTINGS AND OUTLETS.
C. AIR-CHARGING VALVE: FACTORY INSTALLED.
3. CAPACITY AND CHARACTERISTICS:
A. WORKING-PRESSURE RATING: 100 PSIG (690 KPA).
B. CAPACITY ACCEPTABLE: 4 GAL. (15.1 L) MINIMUM.
C. AIR PRECHARGE PRESSURE: SYSTEM OPERATING PRESSURE.

B. DRAIN PANS: CORROSION-RESISTANT PLASTIC WITH RAISED EDGE. COMPLY WITH ANSI/CSA LC 3. INCLUDE DIMENSIONS NOT LESS THAN BASE OF DOMESTIC-WATER HEATER, AND INCLUDE DRAIN OUTLET NOT LESS THAN NPS 3/4 (DN 20) WITH ASME B1.20.1 PIPE THREADS OR WITH ASME B1.20.7 GARDEN-HOSE THREADS.

C. PIPING-TYPE HEAT TRAPS: FIELD-FABRICATED PIPING ARRANGEMENT ACCORDING TO ASHRAE/IESNA 90.1.

D. HEAT-TRAP FITTINGS: ASHRAE 90.2.

E. COMBINATION TEMPERATURE-AND-PRESSURE RELIEF VALVES: INCLUDE RELIEVING CAPACITY AT LEAST AS GREAT AS HEAT INPUT, AND INCLUDE PRESSURE SETTING LESS THAN DOMESTIC-WATER HEATER WORKING-PRESSURE RATING. SELECT RELIEF VALVES WITH SENSING ELEMENT THAT EXTENDS INTO STORAGE TANK.

F. VACUUM RELIEF VALVES: ANSI Z21.22/CSA 4.4-M.

2.3 SOURCE QUALITY CONTROL

A. HYDROSTATICALLY TEST DOMESTIC-WATER HEATERS AND STORAGE TANKS TO MINIMUM OF ONE AND ONE-HALF TIMES PRESSURE RATING BEFORE SHIPMENT.

B. DOMESTIC-WATER HEATERS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS. COMPLY WITH REQUIREMENTS IN SECTION 014000 "QUALITY REQUIREMENTS" FOR RETESTING AND REINSPECTING REQUIREMENTS AND SECTION 017300 "EXECUTION" FOR REQUIREMENTS FOR CORRECTING THE WORK.

C. PREPARE TEST AND INSPECTION REPORTS.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. COMMERCIAL, DOMESTIC-WATER HEATER:
1. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES.
2. ARRANGE UNITS SO CONTROLS AND DEVICES THAT REQUIRE SERVICING ARE ACCESSIBLE.

B. INSTALL DOMESTIC-WATER HEATERS LEVEL AND PLUMB, ACCORDING TO LAYOUT DRAWINGS, ORIGINAL DESIGN, AND REFERENCED STANDARDS. MAINTAIN MANUFACTURER'S RECOMMENDED CLEARANCES. ARRANGE UNITS SO CONTROLS AND DEVICES NEEDING SERVICE ARE ACCESSIBLE.
1. INSTALL SHUTOFF VALVES ON DOMESTIC-WATER-SUPPLY PIPING TO DOMESTIC-WATER HEATERS AND ON DOMESTIC-HOT-WATER OUTLET PIPING.

C. INSTALL COMBINATION TEMPERATURE-AND-PRESSURE RELIEF VALVES IN WATER PIPING FOR DOMESTIC-WATER HEATERS WITHOUT STORAGE. EXTEND COMMERCIAL-WATER-HEATER RELIEF-VALVE OUTLET, WITH DRAIN PIPING SAME AS DOMESTIC-WATER PIPING IN CONTINUOUS DOWNWARD PITCH, AND DISCHARGE BY POSITIVE AIR GAP ONTO CLOSEST FLOOR DRAIN.

D. INSTALL WATER-HEATER DRAIN PIPING AS INDIRECT WASTE TO SPILL BY POSITIVE AIR GAP INTO OPEN DRAINS OR OVER FLOOR DRAINS. INSTALL HOSE-END DRAIN VALVES AT LOW POINTS IN WATER PIPING FOR DOMESTIC-WATER HEATERS THAT DO NOT HAVE TANK DRAINS. COMPLY WITH REQUIREMENTS FOR HOSE-END DRAIN VALVES SPECIFIED IN SECTION 221119 "DOMESTIC WATER PIPING SPECIALTIES."

E. INSTALL THERMOMETER ON OUTLET PIPING OF DOMESTIC-WATER HEATERS. COMPLY WITH REQUIREMENTS FOR THERMOMETERS SPECIFIED IN SECTION 220519 "METERS AND GAGES FOR PLUMBING PIPING."

F. INSTALL PIPING-TYPE HEAT TRAPS ON INLET AND OUTLET PIPING OF DOMESTIC-WATER HEATER STORAGE TANKS WITHOUT INTEGRAL OR FITTING-TYPE HEAT TRAPS.

G. FILL DOMESTIC-WATER HEATERS WITH WATER.

H. CHARGE DOMESTIC-WATER COMPRESSION TANKS WITH AIR.

3.2 CONNECTIONS

A. COMPLY WITH REQUIREMENTS FOR DOMESTIC-WATER PIPING SPECIFIED IN SECTION 221116 "DOMESTIC WATER PIPING."

B. DRAWINGS INDICATE GENERAL ARRANGEMENT OF PIPING, FITTINGS, AND SPECIALTIES.

C. WHERE INSTALLING PIPING ADJACENT TO FUEL-FIRED, DOMESTIC-WATER HEATERS, ALLOW SPACE FOR SERVICE AND MAINTENANCE OF WATER HEATERS. ARRANGE PIPING FOR EASY REMOVAL OF DOMESTIC-WATER HEATERS.

3.3 IDENTIFICATION

A. IDENTIFY SYSTEM COMPONENTS. COMPLY WITH REQUIREMENTS FOR IDENTIFICATION SPECIFIED IN SECTION 220553 "IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT."

3.4 FIELD QUALITY CONTROL

A. PERFORM TESTS AND INSPECTIONS.
1. LEAK TEST: AFTER INSTALLATION, CHARGE SYSTEM AND TEST FOR LEAKS. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST.
2. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER OPERATION.
3. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.

B. PREPARE TEST AND INSPECTION REPORTS.

3.5 DEMONSTRATION

A. TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, AND MAINTAIN COMMERCIAL, STORAGE, DOMESTIC-WATER HEATERS.

END OF SECTION 223400

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TOWN OF SANBORNTON · GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	N.T.S.
DESN. BY:	MJB
DRAWN BY:	DTV
CHKD BY:	TWB
ISSUE DATE:	10/20/2021

STAMP: STATE OF NEW HAMPSHIRE – THOMAS W. BETTERIDGE No. 13988 LICENSED – PROFESSIONAL ENGINEER
10/20/2021

REVISIONS

SHEET TITLE:

SPECIFICATIONS

P5.6

SPECIFICATIONS P5.6

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GENERAL NOTES

1. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR MOUNTING HEIGHTS AND EXACT LOCATIONS OF ALL DEVICES.
2. PERFORM WORK AND PROVIDE MATERIALS AND EQUIPMENT TO MAKE INSTALLATION COMPLETE IN EVERY DETAIL UNDER THIS CONTRACT WHETHER OR NOT SPECIFICALLY SHOWN ON DRAWINGS.
3. ALL CONDUIT, WIRING AND ELECTRICAL EQUIPMENT SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE LATEST STANDARDS OF THE NATIONAL & STATE ELECTRICAL CODES AND ANY APPLICABLE LOCAL REGULATIONS.
4. ALL FLOOR, MASONRY WALLS AND STRUCTURAL CEILING PENETRATIONS SHALL BE SLEEVED.
5. PROVIDE FIRE/MOISTURE SEAL FOR WALL, FLOOR OR CEILING PENETRATIONS.
6. DO NOT LAY CABLES OR RACEWAY ON, OR SUPPORT FROM SUSPENDED CEILING OR PIPING AND DUCTWORK.
7. OUTLET BOXES SHALL BE MOUNTED FLUSH. CONDUIT SHALL BE RUN CONCEALED. WHERE WALLS ARE BLOCK, DEVICES AND WIRING SHALL BE SURFACE MOUNTED. PROVIDE WIREMOLD OR EQUAL TO SURFACE MOUNTED RACEWAY WITH FINISHED BOXES.
8. NO CONDUIT SMALLER THAN 3/4 INCH ELECTRICAL TRADE SIZE SHALL BE USED, UNLESS SPECIFICALLY CALLED FOR ON THE DRAWINGS.
9. ALL WIRING WITHIN UTILITY CLOSETS MAY BE IN SURFACE MOUNTED CONDUIT. EMT MAY BE UTILIZED.
10. FLEXIBLE CONDUIT CONNECTIONS SHALL BE A MAXIMUM OF 6'-0".
11. MC TYPE CONDUCTOR WITH INTEGRAL GROUND WIRE MAY BE UTILIZED FOR POWER AND LIGHTING CIRCUITS. MC CABLE SHALL BE UTILIZED ONLY WHERE COMPLETELY CONCEALED AND INSTALLED IN ACCORDANCE WITH CODE.
12. STEEL OR FIRE-RATED ELECTRICAL BOXES (SWITCHES, OUTLETS, JUNCTION BOXES, ETC.) SHALL BE PROVIDED AND INSTALLED IN ALL FIRE RATED ASSEMBLIES AS IN ACCORDANCE WITH BUILDING AND ELECTRICAL CODES. UL LISTED MOLDABLE PUTTY PADS OR FIREBLOCK/SPRAY FOAM INSULATE SHALL BE USED TO SEAL ALL ANNULAR SPACES/PENETRATIONS AROUND OUTLET BOXES. FIRE RATED ASSEMBLIES INCLUDE EXTERIOR WALLS, FIRE-RATED WALLS, FLOOR/CEILING ASSEMBLIES AND ROOF/CEILING ASSEMBLIES.
13. RECESSED ELECTRICAL ENCLOSURES SUCH AS BUT NOT LIMITED TO; PANELBOARDS, LOW VOLTAGE MEDIA CENTERS, ETC. SHALL BE PROVIDED WITH FIRE-RATED BOXES WHERE INSTALLED IN FIRE-RESISTANCE-RATED ASSEMBLIES. REFER TO ARCHITECTURAL PLANS FOR LOCATIONS OF FIRE-RATED ASSEMBLIES.
14. ALL EQUIPMENT AND WIRING ON DWGS IS SHOWN DIAGRAMMATICALLY. EXACT LOCATION AND METHOD OF SUPPORT SHALL BE DETERMINED IN THE FIELD, EXCEPT WHERE SPECIFIC DIMENSIONS AND DETAILS ARE SHOWN. ALL CONDUIT RUNS SHALL BE RIGIDLY SUPPORTED.
15. COORDINATE WITH ARCHITECTURAL FURNITURE LAYOUTS FOR EXACT LOCATION OF WALL MOUNTED POWER AND COMMUNICATIONS DEVICES. COORDINATE ALL LIGHTING FIXTURES, UNDER CABINET LIGHTING FIXTURES AND SWITCH LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS AND ELEVATIONS.

LIGHTING NOTES

1. ALL CONDUIT, FIXTURES AND OUTLETS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATION AND METHOD OF SUPPORT SHALL BE DETERMINED IN THE FIELD, EXCEPT WHERE SPECIFIC DIMENSIONS AND DETAILS ARE SHOWN.
2. ALL LIGHTING FIXTURE SPACING DIMENSIONS AND MOUNTING HEIGHTS ARE RECOMMENDED LOCATIONS. SLIGHT VARIATIONS WHERE NECESSARY TO AVOID INTERFERENCE SHALL BE DETERMINED IN THE FIELD.
3. WHERE REQUIRED, ADDITIONAL SUPPORT STEEL FOR THE LIGHTING INSTALLATION SHALL BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR. SEISMIC RESTRAINTS SHALL BE INCLUDED AS PER STATE BUILDING CODE.
4. PROVIDE SEPARATE UN-SWITCHED NEUTRAL TO ALL EXIT SIGNS, EMERGENCY BATTERY UNITS AND EMERGENCY LIGHT FIXTURES CONTAINING EMERGENCY BALLASTS.
5. FIRE-RATED BOXES/ENCLOSURES FOR RECESSED LIGHTING FIXTURES SHALL BE PROVIDED AND INSTALLED IN FIRE-RATED ASSEMBLIES AS IN ACCORDANCE WITH BUILDING AND ELECTRICAL CODES. FIRE-RATED ASSEMBLIES INCLUDE; FIRE-RATED WALLS, FLOOR/CEILING ASSEMBLIES AND ROOF/CEILING ASSEMBLIES. REFER TO ARCHITECTURAL PLANS FOR LOCATIONS OF FIRE-RATED ASSEMBLIES.

POWER NOTES

1. ALL CONDUITS ARE SHOWN DIAGRAMMATICALLY. EXACT LOCATION AND METHOD OF SUPPORT SHALL BE DETERMINED IN THE FIELD, EXCEPT WHERE SPECIFIC DIMENSIONS AND DETAILS ARE SHOWN. ALL CONDUIT RUNS SHALL BE RIGIDLY SUPPORTED.
2. NEC - 406.12 TAMPER-RESISTANT RECEPTACLES - IN ALL AREAS SPECIFIED IN 406.12 PARAGRAPHS (1-7) AND ASSEMBLY SUBSETS LISTED IN NEC 518.2, ALL NONLOCKING-TYPE, 125 VOLT, 15 AND 20 AMPERE RECEPTACLES SHALL BE LISTED TAMPER RESISTANT RECEPTACLES.
3. CONDUCTORS AND CABLE SHALL BE MINIMUM #12 AWG, 600 VOLT, COPPER WITH TYPE THHN/THWN INSULATION. PROVIDE SEPARATE GREEN GROUND IN ALL FEEDERS. WIRE SIZE #8 AWG AND LARGER SHALL BE STRANDED, #10 AWG AND SMALLER SHALL BE SOLID. COLOR CODE CONDUCTORS BLACK, RED, BLUE, WITH WHITE NEUTRAL AND GREEN GROUND EXCEPT AS NOTED FOR 120 VOLT.
4. ELECTRICAL CONTRACTOR SHALL CONFIRM ALL NEMA CONFIGURATIONS AND REQUIRED ELECTRICAL REQUIREMENTS OF ALL EQUIPMENT SPECIFICATIONS PRIOR TO ROUGH-IN.

EXISTING EQUIPMENT DESIGNATIONS

X	EXISTING TO BE REMOVED, REMOVE ALL ASSOCIATE CONDUIT AND CONDUCTORS
XM	EXISTING TO REMAIN
XN	EXISTING EQUIPMENT TO BE REPLACED WITH NEW, CONNECT TO NEW EQUIPMENT CIRCUIT
XR	EXISTING EQUIPMENT TO BE RELOCATED, JUNCTION AND EXTEND EXISTING CONDUIT AND CONDUCTORS
XC	NEW EQUIPMENT TO BE CONNECTED TO NEAREST AVAILABLE BRANCH CIRCUIT, PROVIDE NEW BRANCH CIRCUITRY FROM NEAREST EXISTING DEVICE (TO REMAIN) TO NEW DEVICE AS REQUIRED
XL	NEW LOCATION OF EXISTING EQUIPMENT, JUNCTION AND EXTEND CONDUIT AND CONDUCTORS AS REQUIRED

ABBREVIATIONS

A/AMP	AMPERE	IMC	INTERMEDIATE METALLIC CONDUIT
AC	ALTERNATING CURRENT	JB	JUNCTION BOX
AF	AMPERE FRAME	KVA	KILOVOLT-AMPERE
AFF	ABOVE FINISHED FLOOR	KW	KILOWATT
AFG	ABOVE FINISHED GRADE	LTG	LIGHTING
AIC	AMPERE INTERRUPTING CAPACITY	MCB	MAIN CIRCUIT BREAKER
AL	ALUMINUM	MCC	MOTOR CONTROL CENTER
AT	AMPERE TRIP	MEC	MASSACHUSETTS ELECTRICAL CODE
ATS	AUTOMATIC TRANSFER SWITCH	MLO	MAIN LUGS ONLY
AWG	AMERICAN WIRE GAUGE	MTD	MOUNTED
C	CONDUIT	MTG	MOUNTING
CB	CIRCUIT BREAKER	NEC	NATIONAL ELECTRICAL CODE
CKT	CIRCUIT	No. #	NUMBER
CL	CENTERLINE	NS	NON-SYSTEM
CU	COPPER	NTS	NOT TO SCALE
DC	DIRECT CURRENT	PC	PLUMBING CONTRACTOR
DE	DUAL ELEMENT	PWR	POWER
DWG	DRAWING	RGS	RIGID STEEL CONDUIT
EC	ELECTRICAL CONTRACTOR	RMS	ROOT MEAN SQUARE VALUE
EMH	ELECTRICAL MANHOLE	RPM	REVOLUTIONS PER MINUTE
EMT	ELECTRIC METALLIC CONDUIT	SF	SQUARE FOOT
EWC	ELECTRIC WATER COOLER	SN	SOLID NEUTRAL
G/GND	GROUND	ST	SHUT TRIP CIRCUIT BREAKER
GC	GENERAL CONTRACTOR	SWBD	SWITCHBOARD
GE	GROUND-FAULT PROTECTION FOR EQUIPMENT (GFPE CB)	TYP	TYPICAL
GP	GROUND-FAULT PROTECTION FOR PERSONNEL (GFCI CB)	V	VOLTS
GFCI	GROUND-FAULT CIRCUIT-INTERRUPTER	VA	VOLT-AMPERE
HP	HORSEPOWER	VFD	VARIABLE FREQUENCY DRIVE
HVAC	HEATING, VENTILATION AND AIR CONDITIONING	WP	WEATHERPROOF

BRANCH CIRCUIT AND FEEDER SYMBOLS

PP1-2 / PP1-2,4,6 — HOMERUN TO PANELBOARD "PP1", CIRCUIT NUMBER "2
REFER TO PANEL SCHEDULE FOR BREAKER SIZE AND NUMBER OF POLES
CONCEALED UNLESS OTHERWISE NOTED
NUMBER OF ARROWS INDICATES NUMBER OF INDIVIDUAL HOMERUNS "2", "4", AND "6"
UNLESS NOTED OTHERWISE, WIRING FOR EACH CIRCUIT SHALL BE:
20A/1P - 2#12,#12G-¾"C
20A/2P - 3#12,#12G-¾"C
20A/3P - 4#12,#12G-¾"C
WIRING FOR MULTIPLE HOMERUNS MAY BE COMBINED IN CONDUIT IN ACCORDANCE WITH NEC REQUIREMENTS

4#1,#6G-1½"C — HOMERUN FEEDER / BRANCH CIRCUIT CALLOUT:
INDICATES (3) #1 AWG (PHASE), (1) #1 AWG (NEUTRAL), (1) #6 GROUND IN A 1-½" CONDUIT

BRANCH CIRCUIT OR FEEDER CONCEALED UNLESS OTHERWISE NOTED. BRANCH CIRCUIT DIAGONAL LINES INDICATE NUMBER OF CONDUCTORS. GROUND WIRE(S) NOT INDICATED. MINIMUM SIZE CONDUCTOR #12 AWG AND 3/4" CONDUIT, UNLESS OTHERWISE NOTED.

FLEXIBLE CONNECTION TO MOTOR OR EQUIPMENT

LIGHTING AND CONTROLS

FIXTURE SYMBOLS SHOWN BELOW ARE REPRESENTATIVE. NOT ALL SYMBOLS FROM THE PLANS HAVE BEEN SHOWN ON THIS LEGEND. FIXTURE TAG AND CIRCUIT NUMBER LOCATIONS ARE ALSO REPRESENTATIVE. ACTUAL TAG AND CIRCUIT NUMBER LOCATIONS MAY VARY ON PLANS.

LIGHTING FIXTURE (SEE LIGHTING FIXTURE SCHEDULE)
"A" INDICATES LIGHTING FIXTURE TYPE
"#" INDICATES CIRCUIT NUMBER
"a" INDICATES SWITCH CONTROL
"NL" INDICATES NIGHT LIGHT (UNSWITCHED) CIRCUIT

SHADING INDICATES EMERGENCY FIXTURE; EMERGENCY DRIVER OR CONNECTED TO GENERATOR

EMERGENCY BATTERY UNIT WITH (2) TWO HEADS

R — RELAY INSTALLED ABOVE CEILING, ADJACENT TO FIXTURE; ALLOWING FIXTURE TO BE TURNED OFF, BUT SHALL ILLUMINATE IF NORMAL POWER IS LOST. FIXTURE TO BE CONNECTED TO EMERGENCY LIGHTING CIRCUITRY, EQUAL TO NINE 24, INC. CATALOG NO. BLTC R CI 120 (OR277); OR BODINE CATALOG NO. GTD20A

EXIT SIGN, SHADING INDICATES FACE, ARROW INDICATES DIRECTION OF CHEVRON

S_a / S^3 / S^4 / S^D — SINGLE POLE SWITCH, RATED 20A, 120/277V, MOUNTING HEIGHT 48" TO CENTERLINE OF TOGGLE SWITCH IN "ON" POSITION
"a" INDICATES FIXTURE SWITCH CONTROL
"3" INDICATES 3-WAY SWITCH CONTROL
"4" INDICATES 4-WAY SWITCH CONTROL
"D" INDICATES DIMMING CONTROL

120/208V LIGHTING CONTROL PANEL

PC — LIGHTING CONTROL SYSTEM DEVICE
"SC" INDICATES SCENE CONTROLLER
"TS" INDICATES TOUCH SCREEN
"LC" INDICATES LOCAL CONTROL
"PC" INDICATES PHOTOCELL, MOUNTED AT HIGHEST POINT ON ROOF FACING NORTH
"TC" INDICATES TIMECLOCK, SURFACE MOUNTED

TYPICAL SENSOR ANNOTATION:
"a" INDICATES FIXTURE SWITCH CONTROL
"3" INDICATES 3-WAY SWITCH CONTROL
"4" INDICATES 4-WAY SWITCH CONTROL
"D" INDICATED DIMMING CONTROL

3 — WALL OCCUPANCY SENSOR, MULTI-TECHNOLOGY, 180°, 300SF OF COVERAGE

CEILING MOUNTED OCCUPANCY SENSOR, LOW VOLTAGE, 360° TWO-SIDED, 2000SF COVERAGE

TWO DOTS INDICATES DUAL CIRCUIT CEILING OR WALL MOUNTED OCCUPANCY SENSOR

OCCUPANCY SENSOR OVERRIDE SWITCH (RELAY OVERRIDE - LIGHTING CONTROL SYSTEM)

D — CEILING MOUNTED DAYLIGHT SENSOR

MOTORS AND CONTROLS

MOTOR, NUMERAL INDICATES HORSEPOWER

S_M — MANUAL MOTOR STARTED, RATED 20A, 250V, COORDINATE MOUNTING HEIGHT IN FIELD, MOUNTING HEIGHT SHALL NO EXCEED 6'-7" AFF

60A 3R — DISCONNECT SWITCH RATED 30A, 3-POLE, IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED
"3R" INDICATES NEMA TYPE 3R ENCLOSURE
"2P" INDICATES 2-POLE, SINGLE PHASE DISCONNECT
"60A" INDICATES 60A SWITCH

60AF 40AT H 3R — FUSED DISCONNECT SWITCH RATED 30A, 3-POLE, IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED
"3R" INDICATES NEMA TYPE 3R ENCLOSURE
"2P" INDICATES 2-POLE, SINGLE PHASE DISCONNECT
"60AF" INDICATES 60A FUSE SIZE
"40AT" INDICATES 40A TRIP RATING

30A ST — ENCLOSED CIRCUIT BREAKER IN NEMA 1 TYPE ENCLOSURE, UNLESS OTHERWISE NOTED
"30A" INDICATES BREAKER RATING
"3R" INDICATES NEMA TYPE 3R ENCLOSURE
"ST" INDICATES SHUNT-TRIP

CP — CONTROLS
"CP" INDICATES CONTROL PANEL
"VFD" INDICATES VARIABLE FREQUENCY DRIVE
"RGAP" INDICATES REMOTE GENERATOR ANNUNCIATOR PANEL

PANELBOARD AND TERMINAL CABINET

120/208V PANEL, SURFACE MOUNTED, REFER TO PANEL SCHEDULES

120/208V PANEL, RECESSED MOUNTED, REFER TO PANEL SCHEDULES

TELEPHONE TERMINAL, 4'x8' ¾" PLYWOOD BACKBOARD, PAINTED BLACK

CCT — TERMINATION ENCLOSURE
"CCT" INDICATES CENTRAL TELECOMUNICATIONS
"TTB" INDICATES TELEPHONE TERMINAL BLOCK
"CTB" INDICATES CABLE TERMINAL CABINET
"SPD" INDICATES SURGE PROTECTIVE DEVICE

RECEPTACLES AND DEVICES

TYPICAL RECEPTACLE ANNOTATION:
"5" INDICATES CIRCUIT NUMBER
"WP" INDICATES WEATHERPROOF IN-USE COVER
"FB#" INDICATES FLOOR BOX CONFIGURATION, REFER TO FLOOR BOX SCHEDULE / DETAILS FOR ADDITIONAL INFORMATION
REFER TO SPECIFICATIONS FOR ADDITIONAL RECEPTACLE AND DEVICE DETAILS

5 — DUPLEX CONVENIENCE RECEPTACLE OUTLET
DUPLEX CONVENIENCE RECEPTACLE OUTLET, COUNTERTOP MOUNTING
DUPLEX CONVENIENCE RECEPTACLE OUTLET, COORDINATE MOUNTING HEIGHT WITH ARCHITECT
USB DUPLEX CONVENIENCE RECEPTACLE OUTLET
DUPLEX GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE OUTLET
DUPLEX GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE OUTLET, COORDINATE MOUNTING HEIGHT WITH ARCHITECT
USB DUPLEX GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE OUTLET
DUPLEX CONVENIENCE RECEPTACLE OUTLET, FLOOR MOUNTING
DUPLEX RECEPTACLE OUTLET, CEILING MOUNTING
DOUBLE DUPLEX CONVENIENCE RECEPTACLE OUTLET
DOUBLE DUPLEX CONVENIENCE RECEPTACLE OUTLET, COUNTERTOP MOUNTING
DOUBLE DUPLEX CONVENIENCE RECEPTACLE OUTLET, COORDINATE MOUNTING HEIGHT WITH ARCHITECT
USB DOUBLE DUPLEX CONVENIENCE RECEPTACLE OUTLET
DOUBLE DUPLEX GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE OUTLET
DOUBLE DUPLEX GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE OUTLET, COUNTERTOP MOUNTING
DOUBLE DUPLEX CONVENIENCE RECEPTACLE OUTLET, FLOOR MOUNTING
DOUBLE DUPLEX RECEPTACLE OUTLET, CEILING MOUNTING
WIRELESS ACCESS POINT (WAP)
J — JUNCTION BOX, COORDINATE MOUNTING HEIGHT WITH ARCHITECT, "H1" INDICATES HEAT TRACE
P — SPECIAL PURPOSE RECEPTACLE, REFER TO SPECIAL PURPOSE RECEPTACLE SCHEDULE, "#" INDICATES TYPE

TEL / DATA / COMM OUTLETS

REFER TO SPECIFICATIONS FOR ADDITIONAL TEL / DATA DEVICE DETAILS

TV — CABLE TELEVISION CONNECTION, FLUSH MOUNTING WITH SINGLE GANG BACK BOX AND COVER PLATE WITH 'F'-CONNECTOR.
FLOOR MOUNTED CABLE TELEVISION CONNECTION, UTILIZE BRASS COVERPLATE
C — CEILING MOUNTED CABLE TELEVISION CONNECTION WITH SINGLE GANG BACK BOX AND COVER PLATE WITH 'F'-CONNECTOR
TELEPHONE / COMPUTER OR DATA OUTLET (RJ45), WITH SINGLE GANG BACK BOX AND COVER PLATE, ¾" CONDUIT BACK TO SERVER ROOM
FLOOR MOUNTED COMMUNICATIONS OUTLET (RJ45), UTILIZE BRASS COVER PLATE
C — CEILING MOUNTED COMPUTER / ETHERNET OR DATA OUTLET (RJ45) WITH SINGLE GANG BACK BOX AND COVER PLATE
WAC — WIRELESS ACCESS POINT CONTROLLER

SITE SYMBOLS

UNDERGROUND CONDUIT OR DUCT BANK, REFER TO SITE DETAILS FOR ADDITIONAL INFORMATION
HH — ELECTRIC MANHOLE (MH) / HANDHOLE (HH), REFER TO DETAIL
UTILITY POLE
T — PAD MOUNTED TRANSFORMER
SITE LIGHTING FIXTURE, REFER TO LIGHTING FIXTURE SCHEDULE

MISCELLANEOUS

M — UTILITY METER
S — SPEAKER
SURFACE MOUNT RACEWAY, REFER TO DETAILS

ANNOTATIONS

ECH 1 — MECHANICAL EQUIPMENT TAG, REFER TO MECHANICAL EQUIPMENT COORDINATION SCHEDULE FOR ELECTRICAL REQUIREMENTS
200/4 — FEEDER TAG, NUMBER INDICATES AMPERE RATING OF FEEDER AND NUMBER OF WIRES, REFER TO FEEDER SCHEDULE FOR ADDITIONAL INFORMATION
— SHEET NOTE TAG
"#" INDICATES CALL OUT TO CORRESPONDING SHEET NOTE
1 — REVISION TAG
/ E101 — DETAIL CALLOUT
"#" INDICATES THE DETAIL REFERENCE NUMBER
"E101" INDICATES THE DRAWING ON WHICH THE DETAIL CAN BE FOUND
A A — SECTION "A-A", REFER TO DUCTBANK OR CONDUIT SECTION DETAIL

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP
SCALE:		
DESN. BY:	Designer	
DRAWN BY:	Author	
CHKD BY:	Checker	
ISSUE DATE:	10/22/21	

REVISIONS

SHEET TITLE:
ELECTRICAL LEGEND AND NOTES

E0.1

1/8" = 1'-0": 32' 16' 4 8' 4' 0' 64' 32' 16' 0'
3/32" = 1'-0": 64' 32' 16' 8' 0' 32' 16' 8' 0'
1/16" = 1'-0": 16' 8' 0'
3 2 1

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A B C D E F

ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

1. THE OWNERS GENERAL CONDITIONS, SPECIAL CONDITIONS AND SUPPLEMENTAL CONDITIONS OR REQUIREMENTS ARE PART OF THIS WORK.

2. EXAMINATION OF SITE AND CONTRACT DOCUMENT: BEFORE SUBMITTING HIS PROPOSAL, THIS CONTRACTOR SHALL VISIT THE PREMISE AND REVIEW THE ENTIRE PROJECT. THE CONTRACTOR SHALL DETERMINE THE DIFFICULTIES, CONDITIONS, AND DISPOSAL REQUIREMENTS WHICH MAY BE ENCOUNTERED DURING THE WORK. ALL CHARGES RELATED TO MEETING THE INTENT OF THE DRAWINGS AND SPECIFICATIONS SHALL BE INCORPORATED INTO THE BID. IF DISCREPANCIES ARISE BETWEEN THE DRAWINGS AND SPECIFICATIONS, THE MORE STRINGENT REQUIREMENT SHALL APPLY. NO ADDITIONAL CHARGES WILL BE ALLOWED DUE TO EXISTING CONDITIONS.

3. THE INSTALLATION OF ALL ELECTRICAL SYSTEMS SHALL CONFORM TO THE REQUIREMENTS OF THE STATE BUILDING CODE, ELECTRIC CODE, NATIONAL FIRE PROTECTION ASSOCIATION AND ALL OTHER APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND ORDINANCES.

4. ALL MATERIALS SHALL BE NEW AND SHALL BEAR THE UNDERWRITERS' LABEL. SHALL BE PROVIDED IN QUANTITIES NECESSARY TO COMPLETE THE WORK AND SHALL BARE ALL APPLICABLE LABELS FOR INTENDED USE.

5. OBTAIN AND PAY FOR ALL REQUIRED PERMITS, LICENSES AND CERTIFICATES, INCLUDE ALL FEDERAL, STATE AND LOCAL TAXES.

6. WORKMANSHIP: THE ENTIRE WORK PROVIDED IN THIS SPECIFICATION SHALL BE CONSTRUCTED AND FINISHED IN EVERY RESPECT IN A WORKMANLIKE AND SUBSTANTIAL MANNER. EQUIPMENT SHALL BE SECURELY INSTALLED PLUMB AND/OR LEVEL. NO ELECTRICAL EQUIPMENT SHALL BE SUPPORTED BY WORK OF OTHER TRADES. OBTAIN DETAILED INFORMATION FROM THE MANUFACTURERS OF APPARATUS AS TO THE PROPER METHOD OF INSTALLING AND CONNECTING EQUIPMENT. OBTAIN ALL INFORMATION FROM THE GENERAL CONTRACTOR AND OTHER SUBCONTRACTORS, WHICH MAY BE NECESSARY TO FACILITATE WORK AND THE COMPLETION OF THE WHOLE PROJECT.

7. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS. PROVIDE DEVICES AND COMPONENTS SHOWN ON PLANS BUT NOT ON RISERS AND VICE VERSA AS IF EXPRESSLY SHOWN ON BOTH.

8. THE ELECTRICAL CONTRACTOR (EC) SHALL VERIFY THE LOCATIONS AND MOUNTING HEIGHTS OF ALL EQUIPMENT, LIGHT FIXTURES, PANELBOARDS, OUTLETS AND MECHANICAL EQUIPMENT WITH THE OWNER OR ARCHITECT PRIOR TO COMMENCING ANY WORK.

9. THE EC SHALL NOT BORE, NOTCH OR IN ANY WAY CUT INTO THE STRUCTURAL MEMBER, WITHOUT PROPER WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER.

10. EXAMINE ALL DRAWINGS FOR REQUIREMENTS WHICH AFFECT THE WORK OF THIS SECTION. COORDINATE WORK WITH OTHER TRADES.

11. THE ELECTRICAL CONTRACTOR SHALL PROVIDE A COMPLETE TEMPORARY LIGHTING AND POWER SYSTEM FOR THE CONSTRUCTION OF THE PROJECT AND SHALL PAY FOR THE COST OF INSTALLATIONS. THE E.C. SHALL INCLUDE ALL CHARGES FROM THE UTILITY COMPANY TO CONNECT AND DISCONNECT THE TEMPORARY SERVICE. THE COST OF ELECTRICITY SHALL BE BY THE OWNER OR GENERAL CONTRACTOR.

12. RECORD DRAWINGS: IN ACCORDANCE WITH REQUIREMENTS, FURNISH AND KEEP IN THE JOB AT ALL TIMES, TWO (2) COMPLETE AND SEPARATE SETS OF BLACKLINE PRINTS OF THE ELECTRICAL WORK ON WHICH SHALL BE CLEARLY, NEATLY AND ACCURATELY NOTED, PROMPTLY AS THE WORK PROGRESSES, ALL ELECTRICAL CHANGES, REVISIONS AND ADDITIONS TO THE WORK. WHENEVER WORK IS INSTALLED OTHERWISE THAN AS SHOWN ON THE CONTRACT DRAWINGS, SUCH CHANGES SHALL BE NOTED.AT THE CONCLUSION OF WORK, PREPARE RECORD DRAWINGS IN ACCORDANCE WITH GENERAL CONDITIONS.

13. THE COMPLETED ELECTRICAL INSTALLATION SHALL BE GUARANTEED IN WRITING BY THE ELECTRICAL CONTRACTOR TO BE FREE FROM DEFECTS OF MANUFACTURE AND INSTALLATION FOR A PERIOD OF ONE YEAR FROM THE DATE OF WRITTEN ACCEPTANCE BY THE OWNER. ANY FAULT DUE TO DEFECTIVE OR IMPROPER MATERIAL, EQUIPMENT WORKMANSHIP OR DESIGN WHICH MAY DEVELOP SHALL BE MADE GOOD FORTHWITH BY, AND AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR, INCLUDING ALL OTHER DAMAGES DONE TO AREAS, MATERIALS AND OTHER SYSTEMS RESULTING FROM THIS FAILURE.

14. THE EC SHALL NOTIFY THE OWNER/ENGINEER UPON: (1) COMPLETION OF ALL ROUGH WIRING BEFORE CLOSURE OF ALL WALLS AND (2) UPON "SUBSTANTIAL COMPLETION" OF ALL ELECTRICAL WORK. AFTER SUBSTANTIAL COMPLETION, THE OWNER'S REPRESENTATIVE SHALL PREPARE A PUNCH LIST OF ITEMS TO BE CORRECTED. THE EC SHALL CORRECT, AT NO ADDITIONAL COST, ANY DEFICIENCIES FOUND.

15. RELATED WORK BY OTHERS
- 15.1. THERMOSTATS AND CONTROL WIRING SHALL BE SUPPLIED AND INSTALLED BY THE HVAC CONTRACTOR.
- 15.2. STARTERS FOR MECHANICAL EQUIPMENT SHALL BE SUPPLIED BY THE MECHANICAL CONTRACTOR, INSTALLED AND WIRED BY THE ELECTRICAL CONTRACTOR. U.N.O.
- 15.3. DUCT SMOKE DETECTORS ARE PURCHASED AND SUPPLIED BY THE MECHANICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL INSTALL DUCT SMOKE DETECTORS IN DUCT AND PROVIDE SHUTDOWN CONTROL WIRING FROM THE DUCT SMOKE DETECTOR TO THE MOTOR CONTROLLER. WIRING FROM THE DUCT SMOKE DETECTOR TO THE FIRE ALARM CONTROL PANEL SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
- 15.4. CUTTING, PATCHING AND TRENCHING SHALL BE PROVIDED BY THE GENERAL CONTRACTOR.

16. SUBMITTALS: EC SHALL PROVIDE ELECTRONIC PDF SUBMITTALS FOR ELECTRICAL EQUIPMENT TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SUBMITTALS SHALL INDICATE ALL MATERIALS, DIMENSIONS AND RATINGS. PROVIDE INFORMATION ON THE FOLLOWING ITEMS (ALLOW TEN DAYS FOR SUBMITTAL REVIEW):
- 16.1. SWITCHES AND RECEPTACLES
- 16.2. PANELBOARDS
- 16.3. SWITCHBOARDS
- 16.4. LIGHTING FIXTURES AND CONTROLS
- 16.5. ALL FIRE DETECTION SYSTEM COMPONENTS
- 16.6. CIRCUIT BREAKERS
- 16.7. FUSIBLE SWITCHES
- 16.8. WIRING DEVICES
- 16.9. CONDUIT & WIRE
- 16.10. FIRE ALARM (EQUIPMENT CUTS, RISERS, WIRE SIZING, ETC)
- 16.11. TEST REPORTS
- 16.12. SUBSTITUTIONS SHOULD BE NOTED WHEN SUBMITTED WITH AN EXPLANATION FOR THE SUBSTITUTION.
- 16.13. ELEVATIONS OF ALL ELECTRIC ROOMS, WITH PROPOSED MANUFACTURER'S EQUIPMENT SHALL BE SUBMITTED TO SHOW COMPLIANCE WITH NEC CODE REQUIREMENTS.
- 16.14. THE ACCEPTANCE OF SYSTEMS, EQUIPMENT AND DATA SHEETS IS A GENERAL APPROVAL SUBJECT TO THE CONTRACT DRAWINGS, SPECIFICATIONS, AND VERIFICATION OF ALL MEASUREMENTS AT THE JOB. ACCEPTANCE DOES NOT RELIEVE THE ELECTRICAL CONTRACTOR FROM THE RESPONSIBILITY OF DATA SHEET ERRORS OR OMISSIONS. QUANTITY OF ITEMS INDICATED ON SUBMITTAL IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

PART 2 - PRODUCTS

1. GENERAL
- 1.1. AS PART OF THIS CONTRACT, THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL ELECTRICAL EQUIPMENT, DEVICES, MATERIALS AND EQUIPMENT NECESSARY TO MAKE THE INSTALLATION COMPLETE AND OPERATIONAL IN EVERY DETAIL, WHETHER OR NOT SPECIFICALLY INDICATED ON THE DRAWINGS OR SPECIFIED HEREIN.
- 1.2. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND INCLUDE A MANUFACTURERS WARRANTY.
- 1.3. IT IS THE INTENT OF THE SPECIFICATIONS THAT ONE MANUFACTURER BE SELECTED, NOT A COMBINATION, FOR ANY PARTICULAR CLASSIFICATION OF MATERIAL; FOR EXAMPLE, ALL WIRE OF ONE MANUFACTURER, ALL SWITCHES OF ONE MANUFACTURER, ETC., EXCEPT SPECIFIC MATERIAL CLASSIFICATIONS IN WHICH DELIVERY TIME BECOMES A PROBLEM. THE ENGINEER MAY GIVE SPECIFIC EXEMPTION FROM THE REQUIREMENTS.
- 1.4. WHERE MATERIALS, EQUIPMENT, APPARATUS, OR OTHER PRODUCTS ARE SPECIFIED BY MANUFACTURER, BRAND NAME, TYPE OR CATALOG NUMBER, SUCH DESIGNATION IS TO ESTABLISH STANDARDS OF PERFORMANCE, QUALITY, TYPE, AND STYLE.

2. FEEDERS: ALL FEEDERS BETWEEN PANELBOARDS AND SWITCHBOARDS SHALL BE PROVIDED IN TYPE EMT OR GRS CONDUIT; TYPE MC CABLE IS NOT PERMITTED, UNLESS NOTED OTHERWISE.

3. CONCEALED BRANCH CIRCUITS: ALL BRANCH CIRCUIT WIRING SHALL BE CONCEALED WHENEVER POSSIBLE. WITHIN CONCEALED SPACES SUCH AS ABOVE HUNG CEILING AREAS AND WITHIN WALL PARTITIONS:
- 3.1. BRANCH CIRCUIT WIRING SHALL BE TYPE MC CABLE, 12/2 OR 12/3 WITH FULL SIZE INSULATED GROUND WIRE.
- 3.2. MC TYPE CABLE MAY BE UTILIZED FOR FOR POWER AND LIGHTING CIRCUITS.

4. CONDUIT: ALL EXPOSED, OR SURFACE MOUNTED BRANCH CIRCUIT RUNS ABOVE 8'-0" SHALL BE INSTALLED USING TYPE EMT CONDUIT. BELOW 8'-0" RIGID GALVANIZED STEEL CONDUIT SHALL BE INSTALLED.
- 4.1. MINIMUM SIZE CONDUIT USED SHALL BE 3/4".
- 4.2. PROVIDE FIRE RESISTANT RATING AROUND ALL CONDUITS PENETRATING THROUGH FIRE RATED WALLS OR FLOORS. RATING OF FIRE PROOFING SHALL MATCH RATING OF WALLS.
- 4.3. ALL CONDUIT AND EQUIPMENT SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE LATEST RULES AND REGULATIONS OF THE NATIONAL ELECTRICAL CODE.
- 4.4. ALL CONDUITS SHALL HAVE A PROPER SIZE GROUNDING CONDUCTOR.
- 4.5. ALL CONNECTIONS TO MACHINERY AND EQUIPMENT SUBJECT TO VIBRATION SHALL BE MADE WITH FLEXIBLE LIQUIDTIGHT CONDUIT, NOT IN EXCESS OF 6'-0". PROVIDE SUFFICIENT SLACK TO PREVENT VIBRATION TRANSMISSION.
- 4.6. PROVIDE EXPANSION FITTINGS ON ALL CONDUIT PASSING THROUGH BUILDING EXPANSION JOINTS.
- 4.7. CONDUITS ARE SHOWN DIAGRAMMATICALLY EXACT LOCATION AND METHOD OF SUPPORT SHALL BE DETERMINED BY FIELD CONDITIONS. ALL CONDUITS SHALL BE RIGIDLY SUPPORTED.

5. WIRING: WIRING SHALL BE A MINIMUM OF #12 AWG SOLID. ALL WIRE AND CABLE SHALL BE COPPER; NO ALUMINUM IS PERMITTED, WITHOUT APPROVAL OF THE OWNER/ENGINEER ON A VALUE ENGINEERING BASIS. WIRE AND CABLE SHALL BE MANUFACTURED BY PHELPS DODGE COPPER PRODUCTS CORP., GENERAL CABLE CO., TRIANGLE CONDUIT AND CABLE CO., OR EQUAL.
- 5.1. NON-METALIC CONDUIT TYPE NMC/ROMEX SHALL ONLY BE ALLOWED WITH OWNER/ENGINEER APPROVAL & MUST BE ALLOWED BY CODE & BE INSTALLED IN ACCORDANCE WITH CODE REQUIREMENTS.
- 5.2. AWG #8 & LARGER SHALL BE STRANDED, AWG #10 AND SMALLER SHALL BE SOLID.
- 5.1. ALL WIRING (LOW VOLTAGE, TEL/DATA, FIRE ALARM, POWER BRANCH CIRCUIT) SHALL BE PLENUM RATED; NO EXCEPTIONS. NON-PLENUM RATED CABLES OF ANY KIND SHALL NOT BE PROVIDED.
- 5.2. ALL NEW WIRING SHALL BE THHN/THWN RATED 75-90 DEGREES, 600V. WET-DRY LOCATIONS.
- 5.3. BRANCH CIRCUITS LONGER THAN 150 FEET FOR 120V OR 250FT FOR 277V SHALL BE AT LEAST #10AWG FROM PANEL TO LAST OUTLET.
- 5.4. CIRCUITING SHOWN ON THE DWGS IS DIAGRAMMTIC PROVIDE COMPLETE WIRING SYSTEM WHETHER OR NOT INDICATED GRAPHICALLY.
- 5.5. PROVIDE AT LEAST ONE HOT AND ONE NEUTRAL CONDUCTOR FOR ALL INDIVIDUAL BRANCH CIRCUIT WIRING.

6. GROUNDING:
- 6.1. ALL GROUNDING SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE ARTICLE 250, AS AMENDED BY LOCAL AND STATE CODES.
- 6.2. PROVIDE A COMPLETE GROUNDING ELECTRODE SYSTEM AND EQUIPMENT GROUNDING SYSTEM.
- 6.3. CONDUCTORS UTILIZED FOR GROUNDING AND BONDING SHALL HAVE TYPE "THHN" OR BETTER INSULATION.
- 6.4. FOR EACH FEEDER OR RUN OF LIGHTING AND APPLIANCE BRANCH CIRCUITRY, INCLUDE EQUIPMENT AND RACEWAY GROUNDING CONDUCTORS RUN WITHIN THE RACEWAYS. THE INDICATED QUANTITIES OF CONDUCTORS DO NOT INCLUDE THE GROUND WIRES.

7. OUTLET BOXES AND ACCESSORIES:
- 7.1. STEEL OR FIRE RATED ELECTRICAL BOXES (SWITCHES, OUTLETS, JUNCTION BOXES, ETC) SHALL BE PROVIDED AND INSTALLED IN ALL FIRE RATED ASSEMBLIES AS IN ACCORDANCE WITH BUILDING & ELECTRICAL CODES. PROVIDE UL LISTED MOLDABLE PUTTY PADS TO SEAL ANNULAR SPACES/PENETRATIONS AROUND ALL JUNCTION BOXES.
  - 7.1.1. FIRE RATED ASSEMBLIES INCLUDE EXTERIOR WALLS, FIRE RATED WALL, FLOOR/CEILING ASSEMBLIES AND ROOFING/CEILING ASSEMBLIES
- 7.2. PROVIDE GALVANIZED SHEET STEEL OUTLET BOXES FOR ALL OUTLETS UNLESS OTHERWISE NOTED.
- 7.3. ALL OUTLET BOXES FOR PENDANT-MOUNTED FIXTURES SHALL BE GALVANIZED, STAMPED STEEL FURNISHED WITH A FIXTURE STUD, SECURELY MOUNTED TO FRAMING
- 7.4. ALL OUTLET BOXES FOR CONCEALED WORK SHALL BE GALVANIZED, STAMPED STEEL; THOSE FOR FIXTURES, FURNISHED WITH A FIXTURE STUD.
- 7.5. OUTLET BOXES SHALL BE OF SIZE AND TYPE TO ACCOMMODATE (1) STRUCTURAL CONDITIONS, (2) SIZE AND NUMBER OF RACEWAYS, CONDUCTORS OR CABLES ENTERING, AND (3) DEVICES OR FIXTURES FOR WHICH THEY ARE REQUIRED.
- 7.6. INSTALL BLANK PLATES ON ALL OUTLET BOXES, IN WHICH NO APPARATUS IS INSTALLED, WHICH DO NOT INTEGRALLY PROVIDE A COVER FOR THE BOX.
- 7.7. SPECIAL CARE SHALL BE TAKEN TO SET ALL BOXES CORRECTLY SQUARE AND TRUE WITH THE BUILDING FINISH.
- 7.8. FIXTURE OUTLET BOXES SHALL HAVE 3/8" SOLID MALE FIXTURE STUDS AND AUXILIARY FIXTURE STEMS SHALL BE SUPPORTED FROM 3/8" MALE FIXTURE STUDS.
- 7.9. OUTLET BOXES AND ACCESSORIES SHALL BE AS MANUFACTURED BY STEEL CITY, APPLETON, RACO, OR EQUAL.
- 7.10. OUTLET BOXES MOUNTED IN EXTERIOR WALLS SHALL BE GASKETED AND AIR TIGHT.

8. WIRING DEVICES: ALL WIRING DEVICES SHALL BE OF A SINGLE MANUFACTURER, AS MANUFACTURED BY PASS AND SEYMOUR, GENERAL ELECTRIC, HUBBELL, BRYANT ELECTRIC COMPANY, LEVITON, OR EQUAL. MANUFACTURERS LISTED BELOW ESTABLISH MINIMUM REQUIREMENTS. COORDINATE COLOR WITH ARCHITEALL
- 8.1. 20A COMMERCIAL GRADE RECEPTACLES SHALL BE GROUNDING TYPE, 125V. RECEPTACLES SHALL BE BACK AND SIDE WIRED WITH SCREW TYPE TERMINALS OR PRESSURE TYPE, SCREWLESS TERMINALS.
- 8.2. PROVIDE TAMPER RESISTANT GRADE RECEPTACLES IN ALL LOCATIONS AS REQUIRED BY CODE; DWELLING UNIT, CHILD CARE, PRESCHOOLS, BUSINESS OFFICES, MEDICAL, DENTAL AND OUT PATIENT FACILITIES. SUBSETS OF ASSEMBLY GROUPS AND DORMITORIES.
- 8.3. WIRING DEVICES WITHIN COMMERCIAL KITCHEN AND BAR AREAS SHALL BE PROVIDE WITH IN-USE, CLEAR WEATHER PROOF COVER.
- 8.4. SPECIAL EQUIPMENT RECEPTACLES AS REQUIRED SHALL HAVE AN ADDITIONAL GROUNDING LEG AND SHALL BE OF CAPACITY AND CONFIGURATION FOR THE EQUIPMENT TO BE CONNECTED, CONTRACTOR SHALL CONFIRM CONFIGURATION PRIOR TO ROUGH IN.
- 8.5. GFI RECEPTACLES SHALL EACH HAVE GFI TRIPPING (NO FEED THROUGH IS PERMITTED) .
- 8.6. DAMP LOCATION WEATHERPROOF RECEPTACLES SHALL HAVE AN ENCLOSURE THAT IS WEATHERPROOF WHEN THE RECEPTACLE IS COVERED.
- 8.7. WET LOCATION WEATHERPROOF RECEPTACLES SHALL CONFORM TO NEC ARTICLE 406.8(B)(i) AND SHALL HAVE AN ENCLOSURE THAT IS WEATHERPROOF WHETHER OR NOT THE ATTACHMENT PLUG CAP IS INSERTED. PROVIDE RECEPTACLE WITH COVER.
- 8.8. LIGHT SWITCHES: ALL LOCAL WALL SWITCHES SHALL BE OF THE FLUSH QUIET DECORA OR TOGGLE TYPE (AS COORDINATED WITH ARCHITECT), SINGLE-POLE, DOUBLE-POLE, OR THREE-WAY AS REQUIRED.
- 8.9. SENSORS: THE DESIRED SWITCH CONTROL IS SHOWN ON THE DWGS. THE CONTRACTOR SHALL PROVIDE THE SWITCHING AS REQUIRED. ALL NECESSARY APPURTENANCES SHALL BE PROVIDED FOR THE TYPE SWITCHING SELECTED BY THE CONTRACTOR.
  - 8.9.1. THE GENERAL INTENT OF THE SENSOR DESIGN IS FOR ALL WALL SWITCHES WORKING INDEPENDENTLY TO BE LINE VOLTAGE. CEILING SENSORS AND WALL SWITCHES WORKING IN CONJUNCTION WITH CEILING SENSORS SHALL BE LOW VOLTAGE. ALL LOW VOLTAGE SENSORS SHALL BE PROVIDED WITH ALL POWER PACKS AS REQUIRED. SENSORS SHALL BE MOUNTED IN LOCATIONS AS RECOMMENDED BY THE MANUFACTURER. NO ADDITIONAL COMPENSATION WILL BE RECEIVED IF CONTRACTOR HAS TO RELOCATE SENSORS. TIME DELAY SETTINGS SHALL BE SET TO NO LESS THAN 10 MINUTES. COVERAGE DIMENSIONS APPLY TO DEVICE BEING CENTERED. ACTUAL COVERAGE'S CAN VARY ON THE SHAPE AND USE OF APPLICABLE SPACE. COVERAGE MAY BE REDUCED IF DEVICE IS MOUNTED GREATER THAN 12 FEET HIGH.

9. CIRCUIT BREAKERS:
- 9.1. ALL GFI CIRCUIT BREAKERS:
  - 9.1.1. PROVIDED FOR PERSONNEL PROTECTION SHALL BE 5-6mA IN ACCORDANCE WITH NEC REQUIREMENTS.
  - 9.1.2. PROVIDED FOR EQUIPMENT PROTECTION SHALL BE 30mA IN ACCORDANCE WITH NEC REQUIREMENTS.
- 9.2. ALL MULTI-POLE CIRCUIT BREAKERS SHALL BE COMMON INTERNAL TRIP. HANDLE TIES SHALL NOT BE PERMITTED.
- 9.3. ALL CIRCUIT BREAKERS FEEDING 120V SINGLE PHASE LOADS WITHIN DWELLING UNITS SHALL BE ARC FAULT RATED AS REQUIRED BY CODE.
- 9.4. MINIMUM SHORT CIRCUIT INTERRUPTING CAPACITY SHALL BE 10,000AIC AT 240V & 14,000AIC AT 480V.
- 9.5. WHERE REQUIRED BY CODE, PROVIDE COMBINATION ARC-FAULT/GFCI BREAKERS.

10. PANELBOARDS: PROVIDE DEAD FRONT LIGHTING AND POWER PANEL BOARDS WITH PROPER VOLTAGE AND AMP RATING AS REQUIRED.
- 10.1. PANELBOARDS SHALL BE SURFACE- OR FLUSH-MOUNTED AS REQUIRED. PROVIDE COPPER BUS BARS AND FULL SIZE INSULATED NEUTRAL BUS.
- 10.2. PANEL BUSWORK SHALL BE RATED TO CARRY, AS MINIMUM, AMPERE RATING OF OVERCURRENT DEVICE THAT SERVES PANEL.
- 10.3. PANELS WITH FEED_THROUGH BUSING SHALL NOT BE USED.
- 10.4. PROVIDE ANTI TURN, SOLDERLESS LUGS SUITABLE FOR COPPER OR ALUMINUM WIRE.PROVIDE SEPARATELY MOUNTED GROUND BUS FOR EACH PANELBOARD.
- 10.5. GROUND BUS SHALL BE BONDED TO PANELBOARD ENCLOSURE.
- 10.6. PROVIDE BOLT ON, MOLDED CASE, CIRCUIT BREAKERS WITH THERMAL MAGNETIC TRIPS. MULTIPLE POLE BREAKERS SHALL BE SINGLE HANDLE, COMMON TRIP.
- 10.7. PROVIDE HANDLE LOCKS FOR EMERGENCY LIGHTING CIRCUITS, FIRE ALARM, SECURITY, OR OTHER SIMILAR FUNCTIONS. MAIN CIRCUIT BREAKERS SHALL BE MOUNTED VERTICALLY, SEPARATE FROM THE BRANCH BREAKERS.
- 10.8. CURRENT LIMITING CIRCUIT BREAKERS SHALL NOT BE USED.
- 10.9. PANELBOARD TRIM SHALL BE PROVIDED WITH DOOR-IN-DOOR CONSTRUCTION. PANELBOARD SHALL BE CAPABLE OF SUPPORTING ADDITIONAL BOLT-ON CIRCUIT BREAKERS WITHOUT MODIFICATION UP TO THE FRAME SIZE SPECIFIED ON THE DRAWINGS.
- 10.10. PROVIDE FULLY RATED CIRCUIT BREAKERS EQUAL TO SHORT CIRCUIT INTERRUPTING CURRENT SPECIFIED.
- 10.11. PROVIDE TYPED NAME CARD IN EACH PANELBOARD. CARD SHALL INDICATE EQUIPMENT, LIGHTING AREAS, OR RECEPTACLE AREAS FED BY EACH BRANCH CIRCUIT BREAKER.
- 10.12. PANELBOARD DOORS SHALL HAVE FLUSH MOUNTED CATCH AND LOCK WITH TWO KEYS. ALL KEYS FOR PANELBOARDS SHALL BE KEYED ALIKE. PANELBOARDS SHALL BE MANUFACTURED BY EATON, SIEMENS, SQUARE D, OR APPROVED EQUAL.

11. LIGHTING FIXTURES:
- 11.1. SUBSTITUTIONS FOR SCHEDULED LIGHTING EQUIPMENT WILL BE REJECTED UNLESS RECEIVED WITHIN TEN DAYS AFTER CONTRACT AWARD.
- 11.2. LIGHTING FIXTURES SHALL BE PROVIDED COMPLETE, WITH LAMPS AND DRIVERS AS REQUIRED AND AS SHOWN ON THE FIXTURE SCHEDULE. FURNISH ALL FITTINGS AND OTHER MISCELLANEOUS MATERIALS FOR COMPLETE INSTALLATION OF FIXTURES.
- 11.3. SPARE: CONTRACTOR SHALL PROVIDE (3) ADDITIONAL EMERGENCY FIXTURES AND (2) ADDITIONAL EXIT SIGNS. EACH SHALL BE OF THE TYPE SCHEDULED.

12. DISCONNECT SWITCHES: ALL SAFETY SWITCHES SHALL BE NEMA GENERAL-DUTY TYPE HD AND UNDERWRITERS' LABORATORIES LISTED
- 12.1. ALL SWITCHES SHALL HAVE SWITCHBLADES WHICH ARE FULLY VISIBLE IN THE OFF POSITION WITH THE DOOR OPEN. ALL CURRENT CARRYING PARTS SHALL BE PLATED THROUGH ELECTROLYTIC PROCESSES TO RESIST CORROSION AND PROMOTE COOL OPERATION.
- 12.2. SWITCHES SHALL BE QUICK MAKE AND QUICK BREAK SUCH THAT DURING NORMAL OPERATION OF THE SWITCH, THE OPERATION OF THE CONTACTS SHALL BE NOT CAPABLE OF BEING RESTRAINED BY THE OPERATING HANDLE AFTER THE CLOSING OR OPENING ACTION OF THE CONTACTS HAS STARTED. THE HANDLE AND MECHANISM SHALL BE AN INTEGRAL PART OF THE BOX, NOT THE COVER, WITH POSITIVE PADLOCKING PROVISIONS IN THE OFF POSITION.
- 12.3. SWITCHES SHALL BE FURNISHED IN NEMA 1 GENERAL PURPOSE ENCLOSURES. ENCLOSURES SHALL BE OF CODE GAUGE (UL 98) SHEET STEEL (NEMA 1) OR CODE GAUGE PHOSPHATE TREATMENT AND GRAY BAKED ENAMEL FINISH.
  - 12.3.1. EXTERIOR SWITCHES SHALL BE IN A NEMA 3R (RAINTIGHT) ENCLOSURE .
- 12.4. SWITCHES SHALL BE HORSEPOWER RATED FOR 600 VOLTS AC AND ALL SWITCHES SHALL BE FUSED TYPE WITH DUAL ELEMENT FUSES

13. FUSES: SHALL BE NON RENEWABLE TYPE, UL CLASS J UP TO 600 AMP, AND CLASS L OVER 600 AMP. FUSES SHALL BE CURRENT LIMITING TYPE WITH A MINIMUM INTERRUPTING RATING OF 200,000 RMP AMP.
- 13.1. FUSES FOR MOTOR FEEDERS OR MOTOR CIRCUITS SHALL BE CLASS K5 OF A VOLTAGE CLASSIFICATION RATED FOR THE MOTOR WITH A MINIMUM INTERRUPTING CAPACITY OF 100,000 RMS AMP AND WITH TIME DELAY OF A MINIMUM OF 10 SECONDS AT 500% OF MOTOR FULL LOAD AMPS.
- 13.2. FURNISH AND INSTALL ALL FUSES AND ONE COMPLETE SET OF THREE SPARE FUSES FOR EACH SIZE USED.
- 13.3. FUSES SHALL BE MANUFACTURED BY BUSSMAN, GOULD SHAWMUT, LITTLE OR APPROVED EQUAL.

14. EMPTY TELEPHONE/DATA SYSTEM
- 14.1. PROVIDE ACCESS FOR TELEPHONE, DATA, POS AND CABLE TV CABLING TO BE INSTALLED BY OTHERS. AT ALL LOCATIONS SHOWN ON THE DRAWINGS PROVIDE A SINGLE-GANG BACKBOX AND A 1/2" CONDUIT TO THE ACCESSABLE CEILING SPACE ABOVE.
- 14.2. NYLON PULL STRINGS SHALL BE INSTALLED IN ALL EMPTY CONDUITS IN EXCESS OF TEN FEET LONG.
- 14.3. SECURELY TIE PULL STRING AT EACH END.
- 14.4. ALL CONDUITS SHALL BE CONCEALED UNLESS OTHERWISE NOTED.
- 14.5. PURCHASE AND INSTALLATION OF DATA, TELEPHONE WIRING AND JACKS SHALL BE PROVIDED BY OWNERS CHOSEN CONTRACTOR.

PART 3 - EXECUTION

1. SERVICE TO THE FACILITY: ELECTRICAL POWER OUTAGES MUST BE MINIMIZED AS NOT TO INTERFERE WITH THE BUILDING'S OPERATION. THE TIME AND DURATION OF ANY POWER OUTAGE MUST BE APPROVED BY AND SCHEDULED WITH THE BUILDING OWNER/AUTHORITY. THE ELECTRICAL CONTRACTOR SHALL NOTIFY THE OWNER/AUTHORITY AT LEAST TEN CALENDAR DAYS FROM THE DATE OF PROPOSED POWER OUTAGE IN THE FACILITY.

2. DEMOLITION, RELOCATION AND REMOVAL OF EXISTING WIRING
- 2.1. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL ELECTRICAL DEMOLITION, RELOCATION OF CIRCUITS, AND REMOVAL OF EXISTING WIRING NECESSARY FOR THE ELECTRICAL WORK AS SHOWN ON THE DWGS.
- 2.2. THE ELECTRICAL CONTRACTOR SHALL COMPLETELY REMOVE ALL ELECTRICAL SYSTEMS WITHIN THE BUILDING THAT ARE DESIGNATED FOR REMOVAL.
- 2.3. OUTLETS THAT ARE EXISTING FOR USE AS LIGHTING OR RECEPTACLES MAY BE USED AS JUNCTION BOXES FOR THE RE-WIRING OF THE BUILDING IF NECESSARY AND PRACTICAL.
- 2.4. 2.4.THE CONTRACTOR SHALL MAINTAIN, EXTEND, AND CONNECT EXISTING BRANCH CIRCUITS WHICH PASS THROUGH THE CONSTRUCTION AREA, MAINTAINING POWER TO ALL EQUIPMENT AND LIGHTING OUTSIDE OF THE CONSTRUCTION AREA.

3. SPECIAL COORDINATION INSTRUCTIONS
- 3.1. COORDINATION WITH WORK OF OTHER TRADES IS REQUIRED. THE FOLLOWING SPECIAL INSTRUCTIONS SHALL ALSO BE CAREFULLY NOTED:
  - 3.1.1. LOCATIONS AND MOUNTING HEIGHT OF ALL WALL OUTLETS AND LIGHTING FIXTURES SHALL BE VERIFIED WITH THE ARCHITECT/ENGINEER PRIOR TO ROUGHING IN CONDUIT.
  - 3.1.2. ALL FEEDER, BRANCH CIRCUIT OR AUXILIARY SYSTEM WIRING PASSING THROUGH PULL BOXES AND/OR BEING MADE UP IN PANELBOARDS SHALL BE PROPERLY GROUPED, BOUND, AND TIED TOGETHER IN A NEAT AND ORDERLY MANNER, IN KEEPING WITH THE HIGHEST STANDARDS OF THE TRADE, WITH PLASTIC CABLE TIES.
  - 3.1.3. ALL DUPLEX CONVENIENCE AND POWER RECEPTACLES SHALL BE MOUNTED VERTICALLY WITH THE GROUNDING POST TO THE BOTTOM AS THE OUTLET IS VIEWED FROM THE FRONT.
  - 3.1.4. ALL MISCELLANEOUS HARDWARE AND SUPPORT ACCESSORIES, INCLUDING SUPPORT RODS, NUTS, BOLTS, SCREWS, AND OTHER SUCH ITEMS, SHALL BE OF A GALVANIZED OR CADMIUM PLATED FINISH, OR OF OTHER APPROVED RUST INHIBITING COATINGS. CARE SHOULD BE TAKEN THAT FIXTURES SHALL NOT BE INSTALLED ON BOTH SIDES OF EXISTING OR NEW BUILDING EXPANSION JOINTS.
  - 3.1.5. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL MATERIALS, EQUIPMENT, AND WORKMANSHIP TO PROVIDE FOR ADEQUATE PROTECTION OF ALL ELECTRICAL EQUIPMENT DURING THE COURSE OF CONSTRUCTION OF THE PROJECT.
  - 3.1.6. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL APPROVED INSULATION AT TERMINAL CONNECTION POINTS FOR ALL ELECTRICAL CONDUCTING MATERIALS, SUCH AS TRANSFORMER TERMINALS, TERMINAL STUDS, AND AT ANY OTHER SPECIAL LOCATIONS AS DIRECTED BY THE ENGINEER.
  - 3.1.7. PRIOR TO INSTALLATION OF CONDUIT AND WIRE, THE ELECTRICAL CONTRACTOR SHALL COORDINATE WIRING REQUIREMENTS WITH ACTUAL EQUIPMENT SUPPLIED.
  - 3.1.8. THE ELECTRICAL DRAWINGS INDICATE WIRE, CONDUIT, AND OVERCURRENT PROTECTIVE DEVICES TO BE INSTALLED FOR CERTAIN HVAC UNITS. THESE SIZES ARE BASED ON CERTAIN MANUFACTURERS REQUIREMENTS. SHOULD THE GENERAL CONTRACTOR ALLOW THE MECHANICAL CONTRACTOR TO SUBSTITUTE HVAC EQUIPMENT DIFFERENT THAN SPECIFIED, THEN THE GENERAL CONTRACTOR SHALL PROVIDE THE REQUIRED REVISED ELECTRICAL WIRING, CONDUIT, AND OVERCURRENT PROTECTIVE DEVICES IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AT NO ADDITIONAL CHARGE TO THE OWNER.

4. CUTTING, PATCHING, AND DRILLING: THE GENERAL CONTRACTOR SHALL PERFORM PLASTER CUTTING AND CHANNELING AND DRILLING THROUGH STRUCTURAL BEAMS NECESSARY FOR THE INSTALLATION OF ELECTRICAL WORK. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PAINTING AND PATCHING WHICH SHALL MATCH EXISTING BASE MATERIALS IN LOOKS AND COLOR. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ROUTINE DRILLING THROUGH 2 X 4 AND/OR 2 X 6 WOOD FRAME WALLS AND 2 X 10 AND/OR 2 X 12 FLOOR JOISTS IN ORDER TO INSTALL WIRING.

5. COOPERATION AND WORK PROGRESS
- 5.1. THE ELECTRICAL WORK SHALL BE CARRIED ON UNDER THE USUAL CONSTRUCTION CONDITIONS, IN CONJUNCTION WITH ALL OTHER WORK AT THE SITE. THE ELECTRICAL CONTRACTOR SHALL COOPERATE WITH THE ENGINEER AND ALL CONTRACTORS AND EQUIPMENT SUPPLIERS WORKING ON THE SITE, COORDINATE THE WORK, AND PROCEED IN A MANNER SO AS NOT TO DELAY THE PROGRESS OF THE PROJECT.
- 5.2. THE ELECTRICAL CONTRACTOR HAS A RESPONSIBILITY TO COORDINATE THE EXACT MOUNTING ARRANGEMENT AND LOCATION OF EQUIPMENT INDICATED ON THE DRAWINGS TO ALLOW FOR PROPER SPACE REQUIREMENTS FOR EQUIPMENT ACCESS, OPERATION, AND MAINTENANCE.
- 5.3. IT SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO COORDINATE THE DELIVERY OF ELECTRICAL EQUIPMENT TO THE PROJECT PRIOR TO THE TIME INSTALLATION OF EQUIPMENT WILL BE REQUIRED.

6. INSTALLATION OF WIRING, CONDUIT AND BOXES:
- 6.1. ALL CONDUIT AND WIRING SHALL BE INSTALLED CONCEALED.
- 6.2. OUTLET BOXES SHALL BE MOUNTED FLUSH. CONDUIT SHALL BE RUN CONCEALED.
  - 6.2.1. WHERE WALLS ARE BLOCK, DEVICES AND WIRING SHALL BE SURFACE MOUNTED. PROVIDE WIRE MOLD OR EQUAL TO SURFACE MOUNTED RACEWAY WITH FINISHED BOXES.
- 6.3. UNLESS OTHERWISE INDICATED, ALL WIRING SHALL BE (2)#12 AND (1)#12 GROUND, 3/4"C.
- 6.4. CONDUIT ENDS SHALL BE CUT SQUARE, THREADED, AND REAMED TO REMOVE BURRS AND SHARP EDGES. OFFSETS AND BENDS FOR CHANGES IN ELEVATION OF EXPOSED CONDUIT RUNS SHALL BE MADE AT WALLS OR BEAMS AND NOT IN OPEN SPACES BETWEEN WALLS OR BEAMS. CONDUITS SHALL BE ROUTED SO AS NOT TO INTERFERE WITH THE OPERATION OR MAINTENANCE OF ANY EQUIPMENT. STEEL SUPPORTS OR RACKS SHALL BE GALVANIZED STEEL CHANNEL AND FITTINGS.
- 6.5. EXPOSED CONDUITS SHALL BE RUN PARALLEL TO, OR AT RIGHT ANGLES TO, THE WALLS OF THE BUILDING, AND ALL BENDS SHALL BE MADE WITH STANDARD CONDUIT ELLS OR CONDUITS BENT TO - NOT LESS THAN - THE SAME RADIUS. HORIZONTAL RUNS OF EXPOSED CONDUITS SHALL BE CLOSE TO CEILING BEAMS, PASSING OVER WATER OR OTHER PIPING WHERE POSSIBLE AND SHALL BE SUPPORTED BY PIPE STRAPS OR BY OTHER APPROVED MEANS, NOT MORE THAN 5' APART. INSTALLATION OF EXPOSED CONDUITS IN FINISHED AREAS OF THE BUILDING SHALL BE CHECKED WITH THE ENGINEERS FOR LAYOUT BEFORE INSTALLATION TO CONFORM TO THE PATTERN OF THE STRUCTURAL MEMBERS, AND WHEN COMPLETED, IS TO PRESENT THE MOST UNOBTRUSIVE APPEARANCE POSSIBLE. NO EXPOSED CONDUITS WILL BE PERMITTED ON WALLS OR PARTITIONS IN PUBLIC AREAS, UNLESS SPECIFICALLY NOTED.
- 6.6. CONDUITS SHALL NOT BE INSTALLED WITHIN 3" OF HOT WATER PIPES, OR APPLIANCES, EXCEPT WHERE CROSSING IS UNAVOIDABLE AND, IN THAT CASE, THE CONDUIT SHALL BE KEPT AT LEAST 1" FROM COVERING OR PIPE CROSSED.
- 6.7. DO NOT LAY CABLE OR RACEWAY ON, OR SUPPORT FROM SUSPENDED CEILING OR PIPING AND DUCTWORK.
- 6.8. CONDUITS SHALL BE SUPPORTED ON APPROVED TYPE GALVANIZED WALL BRACKETS, CEILING TRAPEZE, STRAP HANGERS, OR PIPE STRAPS, SECURED BY MEANS OF TOGGLE BOLTS ON HOLLOW MASONRY UNITS OR EXPANSION BOLTS IN CONCRETE OR BRICK.
- 6.9. IN GENERAL, NO SPLICES OR JOINTS WILL BE PERMITTED IN EITHER FEEDER OR BRANCHES EXCEPT AT OUTLETS OR ACCESSIBLE JUNCTION BOXES.
- 6.10. ALL SPLICES IN WIRE #8 AWG AND SMALLER SHALL BE STANDARD PIGTAIL, MADE MECHANICALLY TIGHT AND INSULATED WITH PROPER THICKNESS OF INSULATING TAPE.
- 6.11. WIRE #6 AND LARGER SHALL BE CONNECTED TO PANELS AND APPARATUS BY MEANS OF APPROVED LUGS OR CONNECTORS. CONNECTORS SHALL BE SOLDERLESS TYPE, SUFFICIENTLY LARGE TO ENCLOSE ALL STRANDS OF THE CONDUCTOR AND SECURELY FASTENED.
- 6.12. PROVIDE ALL REQUIRED BRANCH CIRCUIT WIRING FOR ELECTRICAL DEVICES AND LIGHTING FIXTURES. DESIGNATIONS SHOWN ON DRAWINGS ARE DIAGRAMMATIC ONLY. CIRCUIT NUMBERS BESIDE RECEPTACLES AND LIGHTING FIXTURES CONVEY THAT A COMPLETE BRANCH CIRCUIT IS REQUIRED BACK TO ELECTRICAL PANELBOARD.SWITCH CONTROL LETTERS ADJACENT TO LIGHTING FIXTURES INDICATE BRANCH WIRING REQUIRED FROM LIGHTING FIXTURE TO LIGHT SWITCH OR DIMMER.

7. COLOR CODING
- 7.1. PROVIDE COLOR CODING FOR SECONDARY SERVICE, FEEDERS, AND BRANCH CIRCUITS AS FOLLOWS, IN ACCORDANCE WITH NEC RECOMMENDATIONS AND STANDARD PRACTICES.
- 7.2. MAKE CONNECTIONS TO TERMINALS FROM LEFT TO RIGHT ARRANGED PHASE A, B, AND C.
- 7.3. PROVIDE SAME COLOR CODING FOR SWITCH LEGS AS CORRESPONDING PHASE CONDUCTOR. PROVIDE COLORED PLASTIC TAPE OF SPECIFIED COLOR CODE IDENTIFICATION FOR LARGE SIZE CONDUCTORS AVAILABLE ONLY IN BLACK.

8. MOTORS, CONNECTIONS, AND CONTROLS
- 8.1. SPLICES AND TERMINATIONS:
  - 8.1.1. MAKE SPLICES AND TERMINATIONS EQUIVALENT ELECTRICALLY AND MECHANICALLY TO CONDUCTOR INSULATION.
  - 8.1.2. MAKE SPLICES AT MOTOR JUNCTION BOXES WITH PRESSURE INDENT CONNECTORS OR SPLIT BOLT CONNECTORS AS SPECIFIED HEREIN.
  - 8.1.3. PROVIDE STANDARD BOLT ON LUGS WITH ALLEN CAP SCREWS TO ATTACH COPPER WIRE AND CABLE TO DISCONNECT SWITCHES AND OTHER ELECTRICAL EQUIPMENT.

9. TEMPERATURE CONTROL WIRING: THE TEMPERATURE CONTROL SYSTEM SHALL BE AN ELECTRIC SYSTEM INSTALLED BY THE HEATING AND AIR-CONDITIONING CONTRACTOR.

10. SALVAGE: THE ELECTRICAL CONTRACTOR SHALL REMOVE ALL ELECTRICAL EQUIPMENT NOT TO BE USED. ALL ELECTRICAL EQUIPMENT REMOVED AND DEEMED SALVAGEABLE BY THE OWNER SHALL BE STORED IN AN AREA DESIGNATED BY THE OWNER.ANY ELECTRICAL EQUIPMENT REMOVED THAT IS NOT DESIRED BY THE OWNER SHALL BE DISPOSED OF AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR.

11. SUPPORTS AND ATTACHMENTS: BOXES AND PENDANTS FOR SURFACE-MOUNTED FIXTURES SHALL BE SUPPORTED IN AN APPROVED MANNER. BOXES AND SUPPORTS SHALL BE FASTENED WITH BOLTS AND EXPANSION SHIELDS ON CONCRETE OR BRICK, WITH TOGGLE BOLTS ON HOLLOW MASONRY UNITS, WITH MACHINE SCREWS ON STEEL WORK WITH LOCKNUTS.THREADED STUDS SHALL BE PROVIDED WITH LOCK WASHERS AND NUTS.

12. QUIET OPERATION: ALL EQUIPMENT AND MATERIAL FURNISHED BY THE ELECTRICAL CONTRACTOR SHALL OPERATE UNDER ALL CONDITIONS OF LOAD WITHOUT OBJECTIONABLE NOISES OR VIBRATIONS, WHICH, IN THE OPINION OF THE ENGINEER, IS OBJECTIONABLE. WHERE SOUND OR VIBRATION CONDITIONS ARISE WHICH ARE CONSIDERED OBJECTIONABLE BY THE ENGINEER, THE ELECTRICAL CONTRACTOR SHALL ELIMINATE SAME IN A MANNER APPROVED BY THE ENGINEER.

13. TESTS: FURNISH ALL LABOR, MATERIAL, INSTRUMENTS, SUPPLIES, AND SERVICES AND BEAR ALL COSTS FOR THE ACCOMPLISHMENT OF TESTS HEREIN SPECIFIED. CORRECT ALL DEFECTS APPEARING UNDER TEST. REPEAT THE TESTS UNTIL NO DEFECTS ARE DISCLOSED. LEAVE THE EQUIPMENT CLEAN AND READY FOR USE.
- 13.1. THE ELECTRICAL CONTRACTOR SHALL PERFORM ANY TEST OTHER THAN HEREIN SPECIFIED WHICH MAY BE SPECIFIED BY LEGAL AUTHORITIES OR BY AGENCIES TO WHOSE REQUIREMENTS THIS WORK IS TO CONFORM.

14. FINAL INSPECTION AND TEST: PRIOR TO TEST, FEEDERS AND BRANCHES SHALL BE CONTINUOUS FROM SERVICE CONTACT POINT TO EACH OUTLET; ALL PANELS, FEEDERS, AND DEVICES CONNECTED AND FUSES IN PLACE. TEST SYSTEM FREE FROM SHORT CIRCUITS AND GROUNDS WITH INSULATION RESISTANCES NOT LESS THAN OUTLINES IN THE NATIONAL ELECTRICAL CODE. PROVIDE TESTING EQUIPMENT NECESSARY AND CONDUCT TEST IN PRESENCE OF THE OWNER'S AUTHORIZED REPRESENTATIVE. THE FINAL INSPECTION AND TEST SHALL INCLUDE THE FOLLOWING:
- 14.1. TESTING OF THE EMERGENCY LIGHTING SYSTEM.
- 14.2. TESTING OF THE IMPEDANCE OF THE GROUNDING SYSTEM.
- 14.3. TESTING OF EACH OUTLET.
- 14.4. TESTING OF THE FIRE ALARM SYSTEM.
- 14.5. TESTING OF BRANCH AND FEEDER CONDUCTORS FOR CONTINUITY.
- 14.6. TESTING OF PANELBOARDS TO VERIFY PROPER CURRENT BALANCE AND VOLTAGE.
- 14.7. TESTING OF MOTORS, VERIFYING PROPER CURRENT BALANCE AND VOLTAGE.
- 14.8. TESTING, TARGETING, AND FOCUSING OF ALL ADJUSTABLE LIGHTING FIXTURES.
- 14.9. TESTING OF ALL GROUND FAULT PROTECTIVE DEVICES IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, SECTION 230-95.

15. FUTURE GENERATOR. ALL OTHER INFRASTRUCTURE TO BE PROVIDED UNDER THIS CONTRACT.
- 15.1. AUTOMATIC TRANSFER SWITCHES
  - 15.1.1. THE AUTOMATIC TRANSFER SWITCHES SHALL BE MECHANICALLY HELD AND ELECTRONICALLY OPERATED BY A SINGLE SOLENOID MECHANISM ENERGIZED FROM THE SOURCE TO WHICH THE LOAD IS TO BE TRANSFERRED. THE SWITCH SHALL BE RATED FOR CONTINUOUS DUTY AND BE INHERENTLY DOUBLE THROW. THE SWITCH SHALL BE MECHANICALLY INTERLOCKED TO ENSURE ONLY ONE (1) OF TWO (2) POSSIBLE POSITIONS - NORMAL OR EMERGENCY.
  - 15.1.2. TRANSFER SWITCH SHALL BE CLOSED TRANSITION TYPE.
  - 15.1.3. ALL MAIN CONTACTS SHALL BE OF SILVER COMPOSITION. THEY SHALL BE PROTECTED BY ARCING CONTACTS. THEY SHALL BE OF THE BLOW-ON CONFIGURATION AND OF SEGMENTED OR BRUSH CONSTRUCTION. THE OPERATING TRANSFER TIME IN EITHER DIRECTION SHALL NOT EXCEED ONE-SIXTH (1/6) OF A SECOND.
  - 15.1.4. ALL CONTACTS, COILS, SPRINGS, AND CONTROL ELEMENTS SHALL BE CONVENIENTLY REMOVABLE FROM THE FRONT OF THE TRANSFER SWITCH WITHOUT MAJOR DISASSEMBLY OR DISCONNECTION OF POWER CONDUCTORS.
  - 15.1.5. AUTOMATIC TRANSFER SWITCHES UTILIZING COMPONENTS OF MOLDED CASE CIRCUIT BREAKERS, CONTACTORS OR PARTS THEREOF WHICH HAVE NOT BEEN INTENDED FOR CONTINUOUS DUTY OR REPETITIVE LOAD TRANSFER SWITCHING ARE NOT ACCEPTABLE.
  - 15.1.6. THE AUTOMATIC TRANSFER SWITCHES SHALL CONFORM TO THE REQUIREMENTS OF NEMA STANDARD ICS 2-447 AND UNDERWRITERS' LABORATORIES, INCORPORATED UL-1008 AND SHALL BE UL LISTED AS FOLLOWS:
    - 15.1.6.1. FOR USE IN EMERGENCY SYSTEMS IN ACCORDANCE WITH ARTICLE 517 AND 700 OF THE NATIONAL ELECTRIC CODE.
  - 15.1.7. RATED IN AMPERES FOR TOTAL SYSTEM TRANSFER INCLUDING CONTROL OF MOTORS, ELECTRIC DISCHARGE, LAMPS, ELECTRIC HEATING AND TUNGSTEN-FILAMENT LAMP LOADS ARE REFERRED TO IN PARAGRAPH 30.9 OF UL-1008.
  - 15.1.8. TRANSFER SWITCHES RATED 400 AMPERES AND LESS SHALL BE SUITABLE FOR 100 PERCENT TUNGSTEN-FILAMENT LAMP LOAD. SWITCHES RATED ABOVE 400 AMPERES SHALL BE SUITABLE FOR 30 PERCENT OR 400 AMPERES TUNGSTEN-FILAMENT LAMP LOAD, WHICHEVER IS HIGHER.
  - 15.1.9. THE AUTOMATIC TRANSFER SWITCHES SHALL BE MOUNTED IN NEMA I NON-VENTILATED, WALL-MOUNTED ENCLOSURES. SWITCHES SHALL BE RATED FOR USE WITH 120/240 VOLT, 1-PHASE, 3-WIRE, 60 HERTZ SYSTEM AND OF RATINGS AS INDICATED ON THE CONTRACT DRAWINGS.
  - 15.1.10. THE AUTOMATIC TRANSFER SWITCH CONTROL PANEL SHALL UTILIZE SOLID-STATE SENSING ON NORMAL AND EMERGENCY FOR AUTOMATIC POSITIVE OPERATION. THE FOLLOWING SHALL BE PROVIDED:
    - 15.1.10.1. ALL PHASES OF THE NORMAL VOLTAGE SHALL BE MONITORED LINE-TO-LINE. CLOSE DIFFERENTIAL VOLTAGE SENSING SHALL BE PROVIDED. THE PICKUP VOLTAGE SHALL BE ADJUSTABLE FROM 85 PERCENT TO 100 PERCENT OF NOMINAL AND THE DROPOUT VOLTAGE SHALL BE ADJUSTABLE FROM 75 PERCENT TO 98 PERCENT OF THE PICKUP VALUE. THE TRANSFER TO EMERGENCY WILL BE INITIATED UPON REDUCTION OF NORMAL SOURCE TO 85 PERCENT OF NOMINAL VOLTAGE AND RETRANSFER TO NORMAL SHALL OCCUR WHEN NORMAL SOURCE RESTORES TO 90 PERCENT OF NOMINAL.
    - 15.1.10.2. INDEPENDENT SINGLE PHASE VOLTAGE AND FREQUENCY SENSING OF THE EMERGENCY SOURCE. THE PICKUP VOLTAGE SHALL BE ADJUSTABLE FROM 85 PERCENT TO 100 PERCENT OF NOMINAL. PICKUP FREQUENCY SHALL BE ADJUSTABLE FROM 90 PERCENT TO 100 PERCENT OF NOMINAL. TRANSFER TO EMERGENCY UPON NORMAL SOURCE FAILURE WHEN EMERGENCY SOURCE VOLTAGE IS 90 PERCENT OR MORE OF NOMINAL AND FREQUENCY IS 95 PERCENT OR MORE OF NOMINAL.
    - 15.1.10.3. A TIME DELAY TO OVERRIDE MOMENTARY NORMAL SOURCE OUTAGES TO DELAY ALL TRANSFER SWITCH AND ENGINE STARTING SIGNALS. THE TIME DELAY SHALL BE FIELD ADJUSTABLE FROM 0.5 TO 6 SECONDS AND FACTORY SET AT 1 SECOND.
      - 15.1.10.3.1. A TIME DELAY ON RETRANSFER TO NORMAL SOURCE. THE TIME DELAY SHALL BE AUTOMATICALLY BYPASSED IF THE EMERGENCY SOURCE FAILS AND NORMAL SOURCE IS AVAILABLE. THE TIME DELAY SHALL BE FIELD ADJUSTABLE FROM 0 TO 30 MINUTES AND FACTORY SET AT 30 MINUTES.
      - 15.1.10.3.2. AN UNLOADED RUNNING TIME DELAY FOR EMERGENCY GENERATOR COOL DOWN. THE TIME DELAY SHALL BE FIELD ADJUSTABLE FROM 0 TO 5 MINUTES AND FACTORY SET AT 5 MINUTES.
      - 15.1.10.3.3. A TIME DELAY ON TRANSFER TO EMERGENCY. INITIALLY SET AT ZERO BUT FIELD ADJUSTABLE UP TO 5 MINUTES FOR CONTROLLED TIMING OF LOAD TRANSFER TO EMERGENCY, WHERE INDICATED.
      - 15.1.10.3.4. A CONTACT THAT CLOSES WHEN NORMAL SOURCE FAILS FOR INITIATING ENGINE STARTING, RATED 10 AMPERES, 32 VOLTS DC. CONTACTS TO BE GOLD PLATED FOR LOW-VOLTAGE SERVICE.
      - 15.1.10.3.5. A WHITE SIGNAL LIGHT TO INDICATE WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO THE NORMAL SOURCE. A YELLOW SIGNAL LIGHT TO INDICATE WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO THE EMERGENCY SOURCE.
      - 15.1.10.3.6. ONE AUXILIARY CONTACT THAT IS CLOSED WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO NORMAL, AND ONE AUXILIARY CONTACT THAT IS CLOSED WHEN THE AUTOMATIC TRANSFER SWITCH IS CONNECTED TO EMERGENCY. RATED 10 AMPERES, 480 VOLTS, 60 HERTZ AC.
    - 15.1.10.4. A TEST SWITCH TO MOMENTARILY SIMULATE NORMAL SOURCE FAILURE.
      - 15.1.10.4.1. THE CONTROL OF THE TRANSFER SWITCHES SHALL BE ELECTRICALLY INTERLOCKED WITH THE EMERGENCY GENERATOR STARTING CONTROL PANEL SO THAT AFTER A PREDETERMINED TIME DELAY FAILURE OF THE NORMAL SOURCE AT THE TRANSFER SWITCHES WILL START THE GENERATOR.
  - 15.1.11. TRANSFER SWITCHES SHALL BE MANUFACTURED BY EATON, RUSSELECTRIC, OR AUTOMATIC SWITCH COMPANY.

TURNER GROUP

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TOWN OF SANBORNTON ★ GRANTED 1748 INCORPORATED 1770 ★

KEY PLAN:

PROJECT TITLE / ADDRESS:

NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

ISSUE:

BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP
SCALE:		
DESN. BY:	Designer	
DRAWN BY:	Author	
CHKD BY:	Checker	
ISSUE DATE:	10/22/21	

REVISIONS

SHEET TITLE:

ELECTRICAL SPECIFICATIONS

E0.2

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LIGHTING FIXTURE SCHEDULE

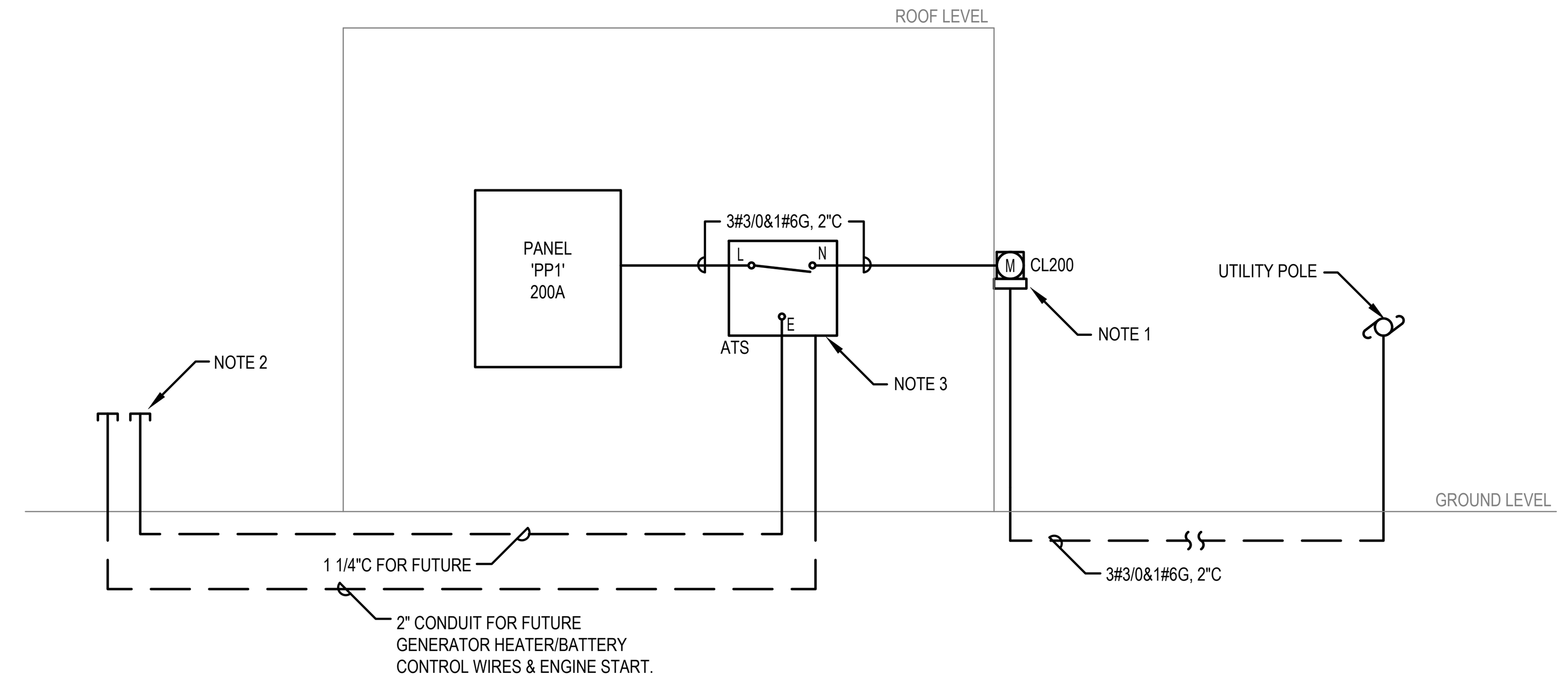
FIXTURE TYPE	DESCRIPTION	MANUFACTURER AND CATALOG NUMBER	LIGHT SOURCE: LUMENS	TEMP (K)	No.	WATTAGE	TYPE	VOLTAGE	NOTES
A	RECESSED LED 2X4	DAYBRITE: 2DLG49L835L-4-D-UNV-DIM	4900	3500	1	37	LED	UNV	
AE	RECESSED LED 2X4 W/ EMERGENCY BATTERY BACKUP	DAYBRITE: 2DLG49L835L-4-D-UNV-DIM-EMLED	4900	3500	1	37	LED	UNV	
BE	RECESSED LED 2X2 W/ EMERGENCY BATTERY BACKUP	DAYBRITE: 2DLG34L835-2-D-UNV-DIM-EMLED	3400	3500	1	27	LED	UNV	
CE8	8' LINEAR LED W/ EMERGENCY BATTERY BACKUP & INTEGRAL MOTION SENSOR	DAYBRITE: FSW840L835-UNV-SDIM-EMLED-LSXR10	4000	3500	1	31.4	LED	UNV	
F	4' LINEAR LED	DAYBRITE: OWL450L835-UNV-DIM	5000	3500	1	53	LED	UNV	
M	RECESSED DOWNLIGHT	LIGHTOLIER: FRAME: L3NZ10U LIGHT ENGINE: L308830F ROUND TRIM: L3RSW	800	3000	1	11.8	LED	UNV	
J	DECORATIVE SEMI-FLUSH	HUBBARDTON FORGE: 124432	-	-	3	100	LED	120	4,5
RE	EXTERIOR WALL MOUNT W/ EMERGENCY BATTERY BACKUP & INTEGRAL SENSOR	LITHONIA: WDGE2 LED P3 27K 90CRI VW MVOLT SRM E20WC PIR DBLXD	2983	2700	1	23	LED	UNV	
SITE LIGHTING									
S1	SITE LIGHTING POLE MOUNT	CREE LIGHTING: MOUNT: OSQ-DA LUMINAIRE: OSQ-A-NM-2ME-B-30K-UL-BK	17291	3000	1	86	LED	UNV	5
EMERGENCY/EGRESS LIGHTING									
EM	WALL MOUNTED EMERGENCY BATTERY UNIT WITH TWO (2) HEADS	EXITRONIX # NFT-W-G2	-	-	2	2.7	LED	120	
X1	SINGLE FACE EDGELIT EXIT SIGN, REFER TO FLOOR PLANS FOR DIRECTIONAL ARROWS AND MOUNTING TYPES (WALL/CEILING)	EXITRONIX # S902-WB-SR-RC-BA	-	-	1	4	LED	120	
	SINGLE FACE THERMOPLASTIC EXIT SIGN, REFER TO FLOOR PLANS FOR DIRECTIONAL ARROWS AND MOUNTING TYPES (WALL/CEILING)	EXITRONIX # QCRS-U-WH	-	-	2	4	LED	120	

LIGHTING FIXTURE NOTES:

1. ALL RECESSED FIXTURE TRIMS TO BE PAINTED TO MATCH CEILING.
2. PROVIDE A COMPLETE AND OPERABLE SYSTEM INCLUDING ALL NECESSARY MOUNTING HARDWARE, POWER FEEDS, WIRING CONNECTIONS, DRIVERS, AND CONTROL INTERFACES.
3. PAINT ALL FLANGES INSTALLED IN DRYWALL TO MATCH ADJACENT CEILING FINISH. FLANGES SHALL BE REMOVED FROM CEILING PRIOR TO PAINTING, OR RAZOR CUT AFTER PAINTING TO ALLOW FOR REMOVAL OF THE TRIM FROM THE CEILING.
4. PROVIDE RETROFIT LED REPLACEMENT BULBS.
5. CONFIRM ALL REQUIREMENTS WITH ARCHITECT/OWNER.

* ELECTRICAL CONTRACTOR SHALL PROVIDE DIMMABLE LED REPLACEMENT LAMPS, LAMP COLOR TEMPERATURE 2700K, AS INDICATED ON THE LIGHTING FIXTURE SCHEDULE.

** ELECTRICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY COMPONENTS FOR A COMPLETE AND OPERATIONAL SYSTEM.



NOTES:

1. PROVIDE NEW UTILITY METER SOCKET/DISCONNECT COMBO. COORDINATE EXACT SEQUENCING (HOT) WITH UTILITY CO.
2. CONDUIT SHALL BE STUBBED UP FOR FUTURE DIESEL GENERATOR LOCATION. COORDINATE LOCATION WITH ARCHITECT/OWNER.
3. PROVIDE 200A, 240V, 3-POLE SERVICE ENTRANCE RATED AUTOMATIC TRANSFER SWITCH FOR TIE-IN WITH FUTURE GENERATOR.

ONE-LINE DIAGRAM

PANEL 'PP1', 225 AMP, 120/240 VOLT, 1-PHASE, 3-WIRE & GND

INTERRUPTING CAPACITY: MATCH EXISTING — MAIN: 200A M.C.B. — MOUNTING: SURFACE

CB TYPE: GP - INDICATES GFCI, L - INDICATES BREAKER LOCK, GE - INDICATES GFPE, S - INDICATES SHUNT TRIP

LOAD DESCRIPTION	CB	TYPE	CIRC NO.	kVA LOAD A	B	C	A	B	C	CIRC NO.	TYPE	CB	LOAD DESCRIPTION
PLANNING/ASSESSOR OFFICE RECEPTACLES	20	--	1	1.08			0.78			2	--	20	LIGHTING
ASSESSOR OFFICE/RECORDS RECEPTACLES	20	--	3		1.26			0.84		4	--	20	LIGHTING
TOWN ADMINISTRATOR OFFICE RECEPTACLES	20	--	5			0.90			0.72	6	--	20	CONFERENCE/BREAK RM RECEPTACLES
PARK AND REC OFFICE RECEPTACLES	20	--	7	0.72			0.36			8	--	20	COUNTER RECEPTACLES
TREASURER OFFICE RECEPTACLES	20	--	9		0.72			0.54		10	--	20	KITCHENETTE COUNTER RECEPTACLES
BREAK RM REFRIGERATOR RECEPTACLE	20	GP	11			1.20			0.36	12	--	20	KITCHENETTE COUNTER RECEPTACLES
WELFARE OFFICE RECEPTACLES	20	--	13	1.08			0.72			14	--	20	IT ROOM RECEPTACLES
TAX COLLECTOR OFFICE RECEPTACLES	20	--	15		1.08			0.36		16	--	20	RESTROOM RECEPTACLES
TOWN CLERK OFFICE RECEPTACLES	20	--	17			0.72			0.54	18	--	20	LOBBY RECEPTACLES
WATER FOUNTAIN RECEPTACLES	20	GP	19	0.36			1.00			20	L	20	FIRE ALARM CONTROL PANEL
SECURITY EQUIPMENT RECEPTACLE	20	--	21		0.36			0.39		22	--	15	ERV-1 & ERV-2 (QTY 2)
HWC-1	15	--	23			0.17			0.39	24			
B-1	15	--	25	0.34			2.02			26	--	30	EWH-1
HWP-1	15	--	27		0.18			2.02		28			
HWP-2	15	--	29			0.18			0.20	30	--	15	HP-1, HP-2, HP-3, HP-4, HP-5 (QTY 5)
CU-1	60	--	31	3.46			0.20			32			
			33		3.46			0.23		34	--	15	HP-6, HP-7, HP-8, HP-9, HP-10, HP-11 (QTY 6)
CU-2	60	--	35			3.46			0.23	36			
			37	3.46			0.26			38	--	20	SITE LIGHTING
WELL PUMP CONNECTION (NOTE 1)	60	--	39		3.36			0.72		40	--	20	CORRIDOR RECEPTACLES
			41			3.36			0.18	42	--	20	MECHANICAL ROOM RECEPTACLES
EXTERIOR RECEPTACLES	20	--	43	0.36			0.36			44	--	20	RESTROOM/CUSTODIAL RECEPTACLES
BDA	20	L	45		1.20			0.00		46	--	20	SPARE
SPARE	20	--	47			0.00			0.00	48	--	20	SPARE
SPARE	20	--	49	0.00			0.00			50	--	20	SPARE
SPACE	-	--	51		0.00			0.00		52	--	-	SPACE
SPACE	-	--	53			0.00			0.00	54	--	-	SPACE

PHASE A 16.55 kVA
PHASE B 16.71 kVA
PHASE C 12.61 kVA

TOTAL LOAD 45.86 kVA

NOTES:

1. INFORMATION NOT AVAILABLE FOR CONSTRUCTION DOCUMENTS. COORDINATE EXACT WELL PUMP POWER REQUIREMENTS WITH PUMP MANUFACTURER/CIVIL ENGINEER.

MECHANICAL EQUIPMENT COORDINATION SCHEDULE

EQUIP. TAG	EQUIPMENT DESCRIPTION	HP	MCA	kVA	VOLT	PHASE	PANEL CIRCUIT No.	CIRCUIT BREAKER	FEEDER	S_M	⊠	◁□	VFD	~	WP	S_D	SEE NOTE
CU-1	VRF SYSTEM OUTDOOR UNIT		36.0	6.91	240	1	PP1-31,33	60A/2P	3#6,1#10G-¾"C			60A		✓	✓		1
CU-2	VRF SYSTEM OUTDOOR UNIT		36.0	6.91	240	1	PP1-35,37	60A/2P	3#6,1#10G-¾"C			60A		✓	✓		1
HP-1	VRF SYSTEM INDOOR UNIT		0.3	0.05	240	1	PP1-30,32	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-2	VRF SYSTEM INDOOR UNIT		0.2	0.05	240	1	PP1-30,32	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-3	VRF SYSTEM INDOOR UNIT		0.3	0.06	240	1	PP1-30,32	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-4	VRF SYSTEM INDOOR UNIT		0.2	0.05	240	1	PP1-30,32	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-5	VRF SYSTEM INDOOR UNIT		1.1	0.20	240	1	PP1-30,32	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-6	VRF SYSTEM INDOOR UNIT		0.3	0.05	240	1	PP1-34,36	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-7	VRF SYSTEM INDOOR UNIT		0.2	0.05	240	1	PP1-34,36	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-8	VRF SYSTEM INDOOR UNIT		1.1	0.20	240	1	PP1-34,36	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-9	VRF SYSTEM INDOOR UNIT		0.2	0.05	240	1	PP1-34,36	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-10	VRF SYSTEM INDOOR UNIT		0.3	0.05	240	1	PP1-34,36	15A/2P	3#12,1#12G-¾"C			30A		✓			1
HP-11	VRF SYSTEM INDOOR UNIT		0.3	0.05	240	1	PP1-34,36	15A/2P	3#12,1#12G-¾"C			30A		✓			1
ERV-1	ENERGY RECOVERY VENTILATOR		2.1	0.39	240	1	PP1-22,24	15A/2P	3#12,1#12G-¾"C			30A		✓			1
ERV-2	ENERGY RECOVERY VENTILATOR		2.1	0.39	240	1	PP1-22,24	15A/2P	3#12,1#12G-¾"C			30A		✓			1
B-1	HOT WATER CONDENSING BOILER		3.5	0.34	120	1	PP1-25	15A/1P	2#12,1#12G-¾"C	✓				✓			1
HWP-1	HVAC PUMP		1.9	0.18	120	1	PP1-27	15A/1P	2#12,1#12G-¾"C	✓				✓			1
HWP-2	HVAC PUMP		1.9	0.18	120	1	PP1-29	15A/1P	2#12,1#12G-¾"C	✓				✓			1
HWC-1	HOT WATER CIRC. PUMP		1.8	0.17	120	1	PP1-23	15A/1P	2#12,1#12G-¾"C	✓				✓			1
EWH-1	ELECTRIC WATER HEATER		21.0	4.03	240	1	PP1-26,28	30A/2P	3#10,1#10G-¾"C			30A		✓			1

MECHANICAL SCHEDULE NOTES:

1. DISCONNECT SWITCH PROVIDED WITH EQUIPMENT, REFER TO MECHANICAL SCHEDULES FOR DETAILS
2. CONTROLLER PROVIDED WITH EQUIPMENT. ELECTRICAL CONTRACTOR SHALL WIRE BRANCH CIRCUIT THROUGH CONTROLLER MOUNTED BY MECHANICAL CONTRACTOR
3. VFD PROVIDED WITH EQUIPMENT, ELECTRICAL CONTRACTOR SHALL WIRE BRANCH CIRCUIT THROUGH VFD MOUNTED BY MECHANICAL CONTRACTOR
4. STARTER PROVIDED WITH EQUIPMENT, ELECTRICAL CONTRACTOR SHALL WIRE BRANCH CIRCUIT THROUGH STARTER MOUNTED BY MECHANICAL CONTRACTOR
5. CONDENSATE PUMP PROVIDED WITH EQUIPMENT, REFER TO FLOOR PLANS FOR DETAILS
6. DUCT MOUNTED SMOKE DETECTOR PROVIDED BY ELECTRICAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR, WIRED BY ELECTRICAL CONTRACTOR
7. DUCT MOUNTED CARBON DIOXIDE DETECTOR PROVIDED BY ELECTRICAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR, WIRED BY ELECTRICAL CONTRACTOR

SCHEDULE NOTES:

1. EQUIPMENT LOCATIONS SHOWN ON ELECTRICAL PLANS ARE APPROXIMATE LOCATIONS ONLY. REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT LOCATIONS.
2. REFER TO MECHANICAL SCHEDULES FOR ADDITIONAL INFORMATION AND DETAILS

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES
TOWN OF SANBORNTON, NH
573 SANBORN RD
SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175	STAMP
SCALE:		
DESN. BY:	Designer	
DRAWN BY:	Author	
CHKD BY:	Checker	
ISSUE DATE:	10/22/21	

REVISIONS

SHEET TITLE:
ELECTRICAL SCHEDULES, SITE PLAN, AND ONE-LINE DIAGRAM

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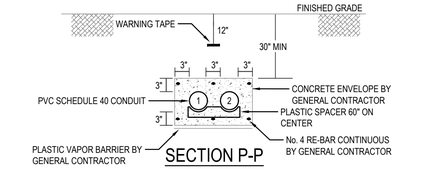
SITE NOTES

1. PROPOSED WELL PUMP LOCATION. COORDINATE EXACT POWER REQUIREMENTS WITH PUMP MANUFACTURER PRIOR TO INSTALLATION. REFER TO CIVIL PLANS FOR EXACT LOCATION.
2. COORDINATE EXACT LOCATION AND QUANTITY OF SITE LIGHTING FIXTURES WITH ARCHITECT/OWNER.

1 Site Plan
SCALE: 1"=20'-0"



SECTION P-P

SECTION C-C

SECTION S-S

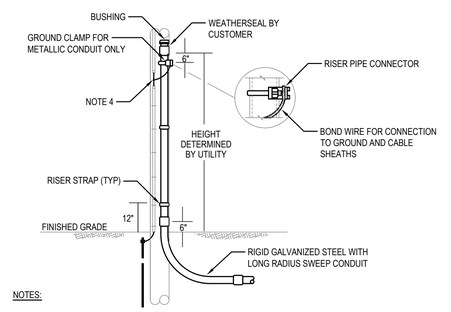
SECTION L-L

NOTES:

1. 5" PVC CONDUIT FOR PRIMARY ELECTRIC SERVICE
2. 5" PVC CONDUIT FOR FUTURE WITH NYLON PULLWIRE (SPARE)
3. 4" PVC CONDUIT FOR COMM SERVICE
4. 2" PVC CONDUIT FOR FUTURE WITH NYLON PULLWIRE (SPARE)
5. 2" PVC CONDUIT FOR SECONDARY ELECTRIC SERVICE
6. 1 1/2" CONDUIT FOR SITE LIGHTING & POWER

* EXACT ROUTING OF SITE CONDUIT SHALL BE COORDINATED IN THE FIELD BY THE ELECTRICAL CONTRACTOR WITH THE GENERAL & LANDSCAPE CONTRACTOR IN ORDER TO AVOID TREE PLANTINGS AND OTHER UNDERGROUND UTILITIES.

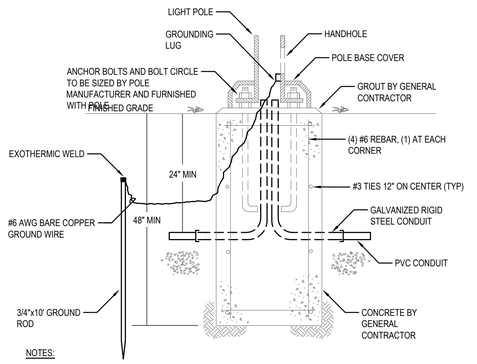
1 DUCTBANK SECTION DETAIL N.T.S.



NOTES:

1. PROVIDE ALL APPURTENANCES REQUIRED BY THE LOCAL UTILITY.
2. RISER CONDUITS SHALL BE LOCATED ON A STREET QUARTER OF POLE AND WHEN POSSIBLE ON THE QUARTER AWAY FROM APPROACHING TRAFFIC.
3. RISER CONDUITS SHOULD NOT BE PLACED ON SAME POLE WITH COMMUNICATION RISER AVOIDABLE.
4. GROUND METAL RISER CONDUITS TO ARRESTOR GROUND LEAD IF AVAILABLE. OTHERWISE, INSTALL A DRIVEN GROUND WITH GROUND WIRE AND MOLDING EXTENDING TO TOP OF STEEL CONDUIT.

2 POLE RISER DETAIL N.T.S.



NOTES:

1. FURNISH POLE BASE TEMPLATE TO GENERAL CONTRACTOR PRIOR TO CONCRETE POUR.
2. REFER TO STRUCTURAL AND ARCHITECTURAL DRAWINGS FOR BASE SIZE AND REBAR REQUIREMENTS.
3. PROVIDE GROUNDING BUSHINGS PER NATIONAL ELECTRICAL CODE.

3 SITE LIGHTING POLE BASE DETAIL N.T.S.

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SHEET TITLE:

ELECTRICAL SITE PLAN AND DETAILS

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1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

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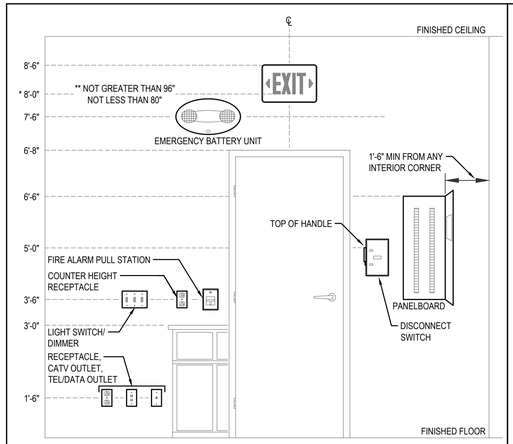
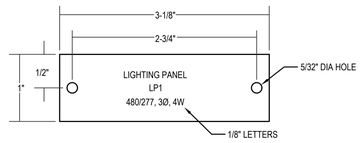


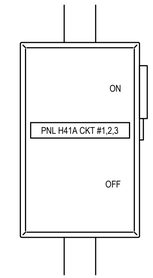
1 DEVICE MOUNTING HEIGHT DETAIL N.T.S.



NOTES:

1. NAMEPLATE TO BE CONSTRUCTED OF 1/16" THICK WHITE SURFACE WITH LETTER ENGRAVED INTO BLACK LAMINATIONS.
2. ALL NAMEPLATES SHALL BE SECURED BY MACHINE SCREWS.
3. NO NAMEPLATES SHALL BE PASTED ON.

2 TYPICAL NAMEPLATE DETAIL N.T.S.



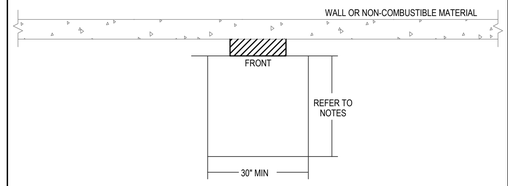
FUSED DISCONNECT SWITCH

NON-FUSED DISCONNECT SWITCH

NOTES:

1. AT A MINIMUM, ELECTRICAL CONTRACTOR SHALL PROVIDE TYPED LABELS WITH PTOUCH MACHINE TO INDICATE PANEL NAME AND CIRCUIT NUMBER. PROVIDE 'EMERGENCY' TYPED LABEL FOR CIRCUITS CONNECTED TO EMERGENCY PANELS. COORDINATE EXACT NAMING WITH PERSONNEL. IF FACILITY STANDARD IS ENGRAVED COVERPLATES, THE ELECTRICAL CONTRACTOR SHALL PROVIDE ENGRAVED COVERPLATES TO MATCH FACILITY REQUIREMENTS.

3 FUSED DISCONNECT LABELING DETAIL N.T.S.



WALL MOUNTED
PANELS

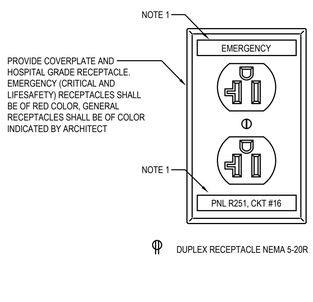
* MINIMUM WORKING CLEARANCE (IN THE DIRECTION OF ACCESS TO LIVE PARTS) AS REQUIRED BY NEC 110-16(a), CONDITION 2 :

- 3' FOR 0-150 VOLT TO GROUND ELECTRIC EQUIPMENT
- 3-1/2' FOR 150-600 VOLT TO GROUND ELECTRIC EQUIPMENT

THE MINIMUM HEADROOM OF WORKING SPACE SHALL BE 6-1/2'

PANELS INCLUDE: POWER PANELS, CONTACTORS, CONTROL CABINETS, DISCONNECT SWITCHES, CONTROL CABINETS, DISCONNECT SWITCHES, MOTOR STARTERS, TIME CLOCK AND SIMILAR ELECTRIC EQUIPMENT.

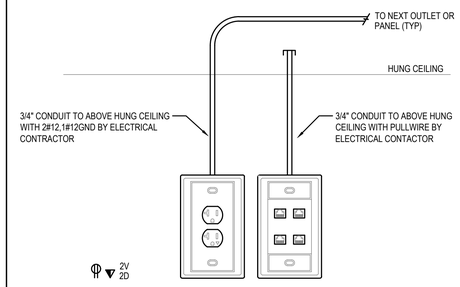
4 CLEARANCES FOR ELECTRIC EQUIPMENT DETAIL N.T.S.



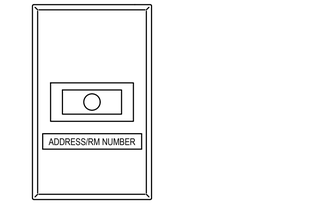
NOTES:

1. AT A MINIMUM, ELECTRICAL CONTRACTOR SHALL PROVIDE TYPED LABELS WITH PTOUCH MACHINE TO INDICATE PANEL NAME AND CIRCUIT NUMBER. PROVIDE 'EMERGENCY' TYPED LABEL FOR CIRCUITS CONNECTED TO EMERGENCY PANELS. COORDINATE EXACT NAMING WITH FACILITY'S PERSONNEL. IF FACILITY STANDARD IS ENGRAVED COVERPLATES, THE ELECTRICAL CONTRACTOR SHALL PROVIDE ENGRAVED COVERPLATES TO MATCH FACILITY REQUIREMENTS.

5 TYPICAL RECEPTACLE LABELING DETAIL N.T.S.



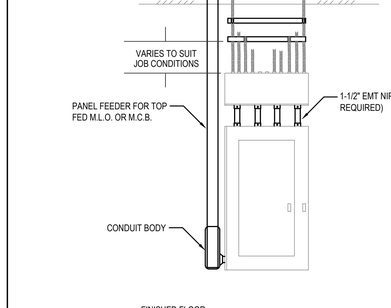
6 TYPICAL WORK STATION DETAIL N.T.S.



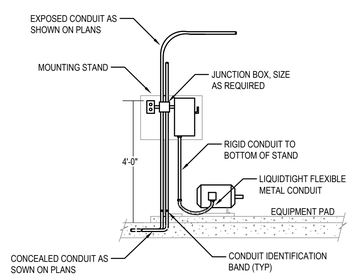
NOTES:

1. AT A MINIMUM, ELECTRICAL CONTRACTOR SHALL PROVIDE TYPED LABELS WITH PTOUCH MACHINE TO INDICATE ADDRESS OF FIRE ALARM DEVICE WITHIN ENCLOSED ROOM OR ROOM NUMBER IF SYSTEMS IS ZONED. LABELING SYSTEM SHALL BE APPLIED BUT NOT LIMITED TO THE FOLLOWING DEVICES: AUDIBLE/VISUAL DEVICE, VISUAL DEVICE, SMOKE DETECTOR, REMOTE TEST STATION, REMOTE ALARM INDICATOR, FLOW SWITCH, TAMPER SWITCH, ETC.

7 TYPICAL FIRE ALARM DEVICE LABELING DETAIL N.T.S.



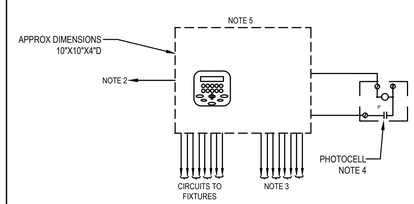
11 TYPICAL PANELBOARD/BRANCH CIRCUIT WIRING DETAIL N.T.S.



NOTES:

1. GROUND WIRE CONNECTED TO LUG IN MOTOR JUNCTION BOX.

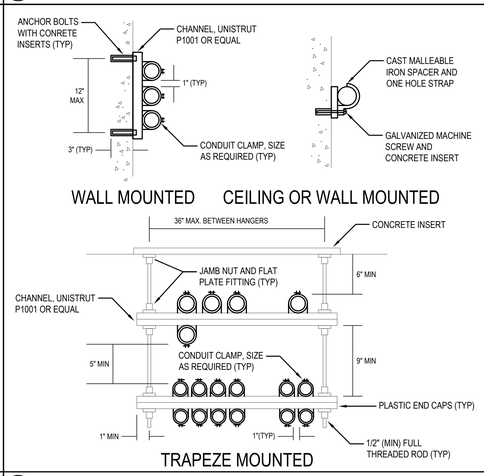
8 MOTOR FEED DETAIL N.T.S.



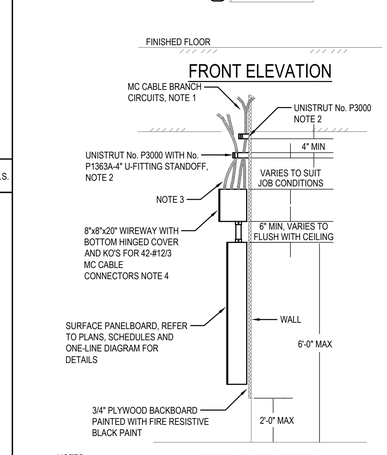
NOTES:

1. SITE LIGHTING CONTROL PANEL SHALL CONTROL ALL NEW SITE LIGHTING CIRCUITS SHOWN ON PLANS AND EXISTING SITE LIGHTING CIRCUITS TO REMAIN (EG. SIGNAGE, ETC).
2. 120V POWER SUPPLY
3. ROOF MOUNTED PHOTO-ELECTRIC CONTROL UNIT WITH OUTLET BOX AND FACE PLATE. TORK No. 2101 FOR 120 VOLT CONTROL CIRCUITS OR TORK No. 2104 FOR 208/277 VOLT CONTROL CIRCUITS. FACE UNIT TO NORTH.
4. RELAY LIGHTING CONTROL PANEL WITH INTERNAL TIME CLOCK AND PHOTOCELL INPUT.
   4.1. AT A MINIMUM, PROVIDE (2) TWO POLE RELAYS AND (6) SINGLE POLE RELAYS. ALL RELAYS SHALL BE RATED 277V.
   4.2. LITHONIA BLUE BOX LIGHTING CONTROL PANEL OR EQUAL.

9 TIME SWITCH PHOTOCELL CONTROLLED SITE LIGHTING RELAY PANEL N.T.S.



10 CONDUIT MOUNTING DETAIL N.T.S.



NOTES:

1. SUPPORT ALL CABLE RUNS FROM BUILDING STRUCTURE TO HIGH ABOVE CEILING. DO NOT ALLOW CABLES TO LAY-ON HUNG CEILINGS AT ANY POINT IN RUN.
2. PROVIDE UNISTRUT No. M5026 OR No. M5028 CABLE/CONDUIT CLAMPS FOR EACH BRANCH CIRCUIT. INSTALL ALL INSIDE CABLE RUNS ON INSIDE STRUT AND INSIDE WIREWAY KO'S BEFORE INSTALLING ANY RUNS ON OUTSIDE STRUT. SUPPLY AND INSTALL ONE SPARE CLAMP FOR EACH SPARE OR SPACE IN PANELBOARD.
3. INSTALL MARKER TAPE INDICATING CIRCUIT NUMBERS FOR EACH CABLE RUN.
4. CUT BACK CABLE ARMOR JACKET SUFFICIENT TO RUN CONDUCTORS THRU WIREWAY AND NIPPLES TO EACH CIRCUIT BREAKER. WITHOUT SPLICES.
5. CONDUCTORS RUN IN PANELBOARDS, NIPPLES AND WIREWAY SHALL BE GROUPED WITH 3 PHASES AND NEUTRALS IN EACH BUNDLED CONDITION TO AVOID INDUCTIVE HEATING IN METALLIC ENCLOSURES.

12 TYPICAL PANELBOARD/BRANCH CIRCUIT WIRING DETAIL N.T.S.

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ELECTRICAL DETAILS

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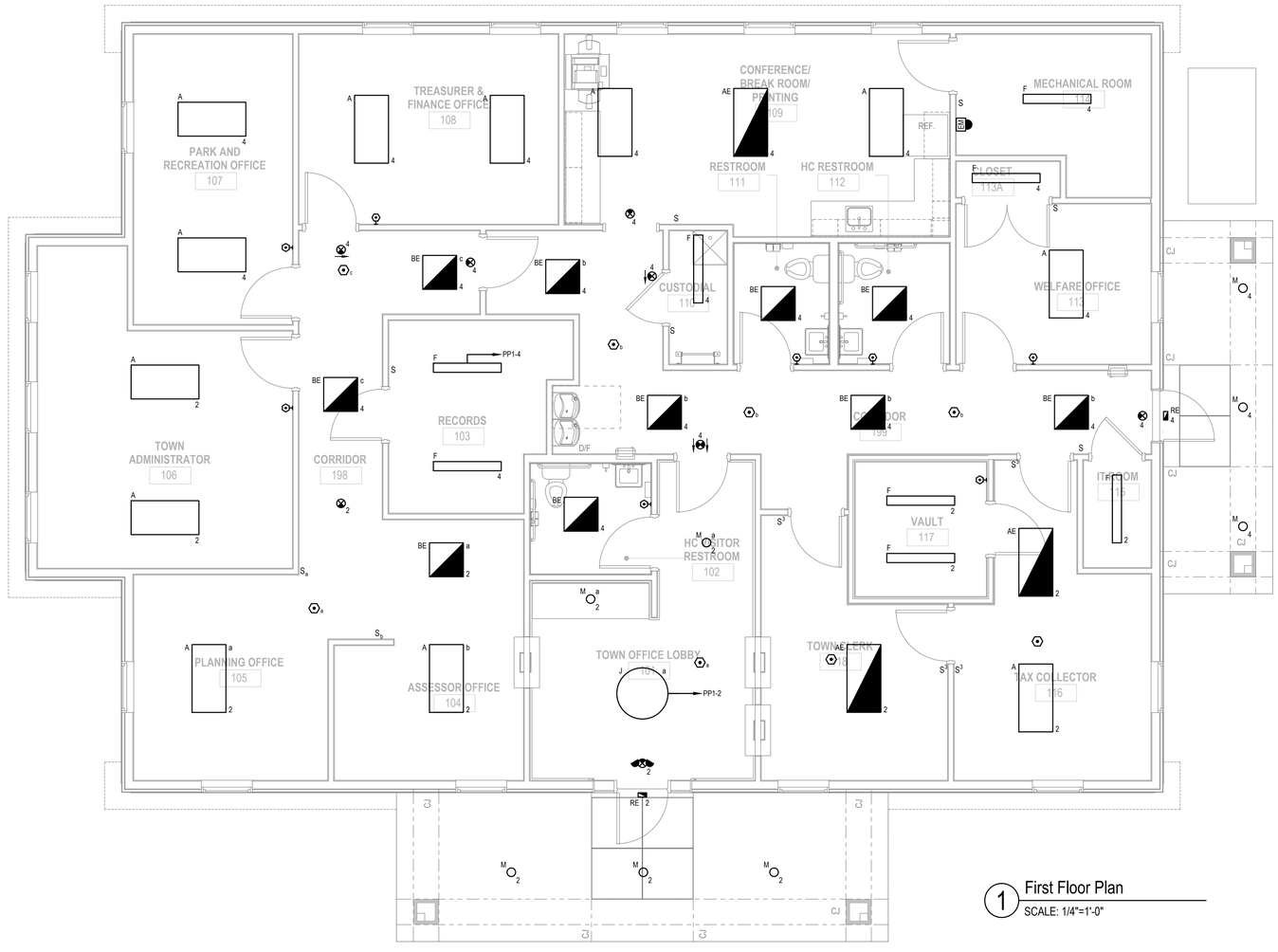

1 First Floor Plan
SCALE: 1/4"=1'-0"

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SANBORNTON, NH

ISSUE:
BID PACK No. 2
10/20/2021

PROJ. NO.:	5175
SCALE:	
DESN. BY:	Designer
DRAWN BY:	Author
CHKD BY:	Checker
ISSUE DATE:	10/22/21

STAMP

REVISIONS

SHEET TITLE:
ELECTRICAL LIGHTING PLAN

E1.0

1/8" = 1'-0" | 3/32" = 1'-0" | 1/16" = 1'-0"

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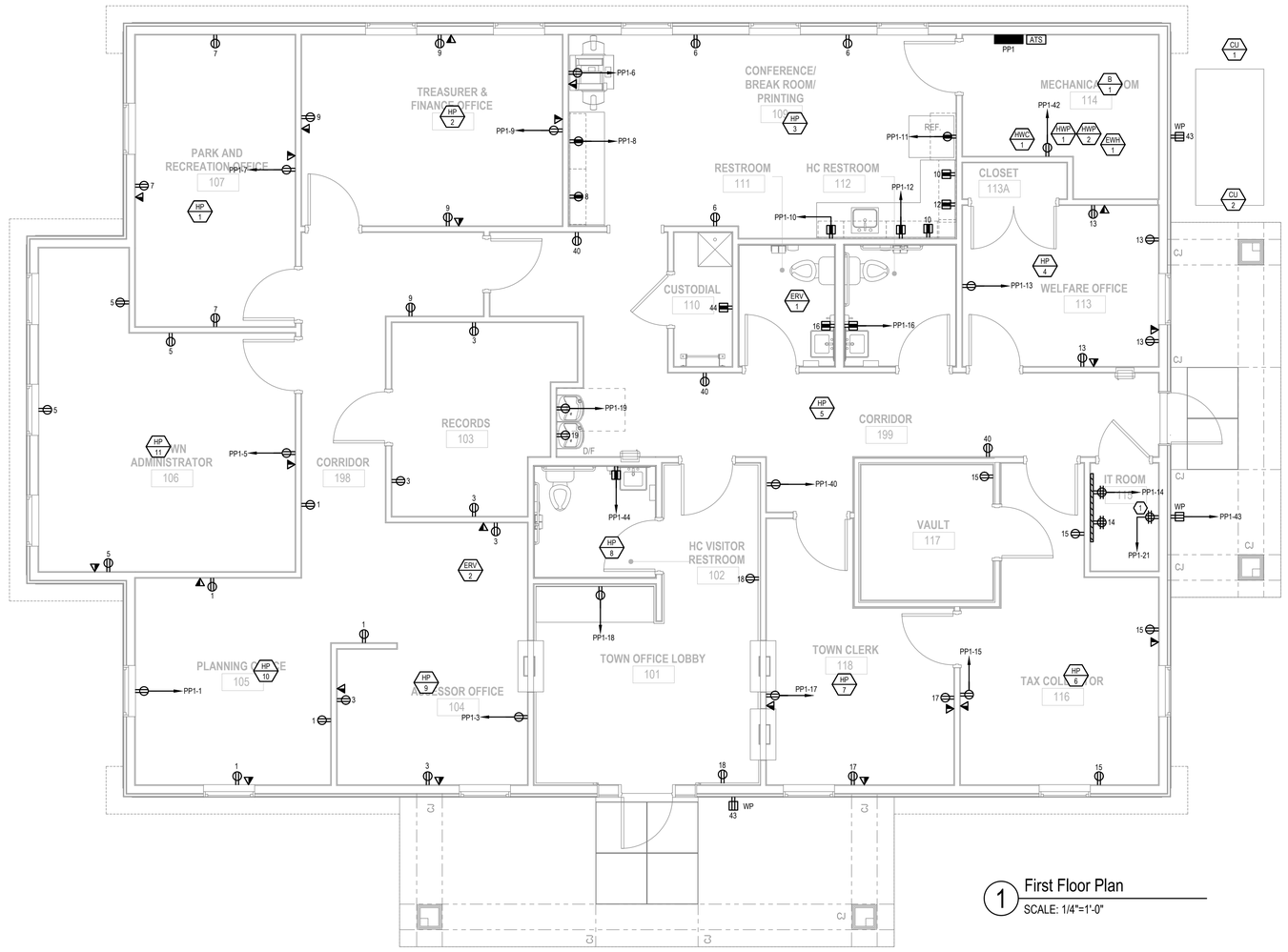
SHEET NOTES

1. RECEPTACLE FOR OWNER PROVIDED SECURITY EQUIPMENT. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH OWNER SECURITY VENDOR PRIOR TO ROUGH-IN.



1 First Floor Plan
SCALE: 1/4"=1'-0"

TURNER GROUP

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TOWN OF SANBORNTON GRANTED 1748 INCORPORATED 1770

KEY PLAN:

PROJECT TITLE / ADDRESS:
NEW SANBORNTON TOWN OFFICES

TOWN OF SANBORNTON, NH

573 SANBORN RD
SANBORNTON, NH

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ELECTRICAL POWER PLAN

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FIRE ALARM SPECIFICATION

1. FIRE DETECTION AND ALARM SYSTEM

1.1. GENERAL

1.1.1. THE CONTRACTOR MUST OBTAIN A PERMIT FROM THE FIRE DEPARTMENT PRIOR TO COMMENCEMENT OF EQUIPMENT INSTALLATION. ALL WORK SHALL BE DONE IN CONFORMANCE WITH THE LOCAL FIRE DEPARTMENT INSTALLATION REQUIREMENTS AND SYSTEM INSTALLATION GUIDELINES.

1.1.2. ALL FIRE ALARM DEVICES AND EQUIPMENT USED SHALL BE APPROVED FOR USE BY THE LOCAL FIRE DEPARTMENT.

1.1.3. THE CONTRACTOR SHALL FURNISH, INSTALL AND PLACE IN OPERATION AN ADDRESSABLE, SUPERVISED, GENERAL EVACUATION FIRE ALARM SYSTEM FOR THE COMPLETE BUILDING, UNLESS NOTED OTHERWISE.

1.1.4. THE COMPLETED FIRE ALARM SYSTEM SHALL MEET ALL LOCAL AND STATE CODES.

1.1.5. EQUIPMENT AND COMPLETED INSTALLATION SHALL BE U.L. LISTED OR APPROVED AND SHALL MEET APPROVAL OF THE LOCAL FIRE DEPARTMENT, STATE FIRE MARSHALL, AUTHORITIES HAVING JURISDICTION AND SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, ADA CODE, NFPA 70, 72 AND 72E.

1.1.6. THE COMPLETE SYSTEM SHALL CONTAIN SMOKE DETECTION, HEAT DETECTORS, AUDIO/VISUAL ALARMS, PULL STATIONS, AND OTHER DEVICES INCLUDING POWER SUPPLIES AS REQUIRED FOR A COMPLETE SYSTEM.

1.1.7. THE OWNER SHALL BE RESPONSIBLE FOR TELEPHONE CONNECTION COMPANY CHARGES AND/OR SECOND PARTY MONITORING COMPANY FEES.

1.1.8. DEVICE ADDRESSES SHALL BE LEGIBLE WITHOUT REMOVAL OF THE DETECTOR. THE DETECTOR ADDRESS SHALL BE CONCEALED WHEN PLACED INTO THE BASE.

1.1.9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF DEDICATED TELEPHONE HOMERUN WIRING.

1.2. MAIN FIRE ALARM CONTROL PANEL (FACP)

1.2.1. ELECTRICAL CONTRACTOR SHALL PROVIDE AN ADDRESSABLE MAIN FIRE ALARM CONTROL PANEL. CONTROL PANEL SHALL CONTAIN THE REQUIRED NUMBER OF SUPERVISED INITIATING AND INDICATING CIRCUITS FOR THE BUILDING.

1.2.2. THE SYSTEM SHALL HAVE BUILT-IN 24 VOLTS DC POWER SUPPLY AND INTEGRAL BATTERY CHARGER.

1.2.3. TWENTY-FOUR (24) HOURS OF BATTERY STANDBY POWER SHALL BE PROVIDED WITH FIVE (5) MINUTES OF ALARM SIGNALING AT THE END OF THIS TWENTY-FOUR (24) HOUR PERIOD, AS REQUIRED BY NFPA 72. ALSO PROVIDE 20% ADDITIONAL BATTERY CAPACITY.

1.2.4. LIGHTNING PROTECTION SHALL BE INCLUDED WITHIN THE FACP TO PROTECT THE PANEL FROM LIGHTNING SURGES ON THE 120 VOLT SUPPLY CIRCUIT.

1.2.5. THE FACP SHALL TRANSMIT AN ALARM SIGNAL TO THE LOCAL FIRE DEPARTMENT VIA A METHOD COORDINATED WITH THE LOCAL FIRE DEPARTMENT. IN ACCORDANCE WITH NFPA 72, COMMON METHODS ARE INDICATED BELOW:

1.2.5.1. THE FACP SHALL HAVE A DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT) TO ENABLE AUTOMATIC TRANSMISSION OF THE ALARM SIGNAL TO THE FIRE DEPARTMENT.

1.2.5.2. DACT CELLULAR COMMUNICATOR.

1.2.5.3. RADIO COMMUNICATOR PER LOCAL FIRE DEPARTMENT REQUIREMENTS.

1.3. SEQUENCE OF OPERATIONS: REFER TO SEQUENCE OF OPERATIONS INPUT/OUTPUT MATRIX

1.4. REMOTE DEVICES

1.4.1. SMOKE DETECTORS SHALL BE ADDRESSABLE PHOTOELECTRIC TYPE (UNLESS NOTED OTHERWISE) AND SHALL OPERATE AT 24 VOLTS DC. PROVIDE DOUBLE CONTACT BASE FOR SMOKE DETECTORS USED FOR ELEVATOR RECALL AND TO OPERATE REMOTE LED'S.

1.4.2. HEAT DETECTORS SHALL BE ADDRESSABLE (UNLESS NOTED OTHERWISE), LOW PROFILE, MATTE WHITE, 200 DEGREE FIXED TEMPERATURE OR 135 DEGREES RATE OF RISE TYPE.

1.4.3. PULL STATIONS SHALL BE ADDRESSABLE (UNLESS NOTED OTHERWISE), SEMI-FLUSH, DOUBLE ACTION.

1.4.4. HORN/STROBE DEVICES SHALL BE PROVIDED IN A COMMON ENCLOSURE. THE VISIBLE STROBE SHALL MEET ALL THE REQUIREMENTS OF THE ADA.

1.4.5. BOOSTER PANEL - BOOSTER PANEL SHALL PROVIDE REMOTE POWER WITH BUILT IN BATTERY CHARGER CONNECTED TO ANY 12 OR 24 VOLT FIRE ALARM CONTROL PANEL. PRIMARY APPLICATIONS INCLUDE NAC SYNCHRONIZATION OR AUXILIARY POWER TO SUPPORT 24 VOLT ACCESSORIES.

1.4.6. MONITOR MODULES SHALL BE PROVIDED TO MONITOR AND CONNECT CONVENTIONAL INITIATING DEVICES ONTO THE ADDRESSABLE LOOP.

1.4.7. REMOTE ALARM INDICATORS SHALL BE LED INDICATORS ON SINGLE PLASTIC PLATES.

1.4.8. CONTROL & RELAY MODULES SHALL BE USED TO CONTROL CONVENTIONAL DEVICES (NOTIFICATION CIRCUITS, AHU'S, DOOR HOLDERS, ETC), OVER THE ADDRESSABLE LOOP. MODULES SHALL BE PROVIDE A SUPERVISED OUTPUT RATED FOR 2 AMP AT 24 VOLTS DC AND 0.5 AMP AT 120 VOLT.

1.4.9. STROBE ONLY DEVICES SHALL BE PROVIDED AND SHALL MEET ALL REQUIREMENTS OF NFPA AND ADA CODES.

1.4.9.1. PROVIDE LED TYPE REMOTE ANNUNCIATOR, POSITIONED AS SHOWN ON THE DRAWINGS. THE ANNUNCIATOR SHALL BE FLUSH MOUNTED TYPE AND SHALL BE SUPERVISED FOR SYSTEM TROUBLE. ALL ALARM LED'S AND WIRING SHALL BE SUPERVISED. THE NUMBER OF ZONES SHALL BE AS SHOWN ON THE DRAWINGS.

1.5. WIRING

1.5.1. ALL FIRE ALARM WIRE AND CABLE SHALL BE UL LISTED FOR FIRE ALARM USE.

1.5.2. THE FIRE ALARM SYSTEM SHALL BE A COMPLETE AUTOMATIC AND MANUAL, CLOSED CIRCUIT, CLASS A, 4 WIRE, CONNECTED AND LEFT IN FIRST-CLASS OPERATING CONDITION.

1.5.3. FOR FIRE ALARM WIRING IN ENCLOSED SPACES, PROVIDE PLENUM RATED, TYPE FPLP, WITH RED OUTER JACKET. INSTALLATION SHALL MEET REQUIREMENTS OF NEC ARTICLE 770 AND 725. CONDUCTORS SHALL BE SOLID COPPER #14 MINIMUM, WITH LOW SMOKE, LOW FLAME TYPE JACKET.

1.5.4. FOR FIRE ALARM WIRING IN EXPOSED AREAS, PROVIDE TYPE THHN INSULATION. WIRE SIZE SHALL BE #14 AWG MINIMUM. ALL SURFACE MOUNTED WIRING RELATED TO THE FIRE ALARM SYSTEM SHALL BE INSTALLED IN TYPE EMT/RGS CONDUIT.

1.5.5. ALL JOINTS AND CONNECTIONS SHALL BE IN JUNCTION BOXES. ALL CONNECTIONS NOT ON APPROVED TERMINAL STRIPS SHALL BE SOLDERED AND TAPED. ALL JUNCTION BOXES SHALL BE PAINTED RED.

1.6. TWO-HOUR RESISTIVE CABLES

1.6.1. CABLES SHALL MEET NFPA 70, NFPA 72, UL CATEGORY FHIT SYSTEM 40A.

1.6.2. CABLES SHALL BE EQUAL TO COMTRAN CABLE'S VITALINK FHIT SYSTEM 40A TWO-HOUR FIRE RATED CIRCUIT INTEGRITY (CI/CIC) CABLE.

1.7. MANUFACTURERS

1.7.1. COMPLETE SYSTEMS SHALL BE MANUFACTURED BY FCI (FIRE CONTROL INSTRUMENTS), EDWARDS, NOTIFIER, SIMPLEX, OR EQUAL.

1.8. TESTING

1.8.1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FIRE ALARM TESTING AND CERTIFICATION CHARGES.

1.8.2. CERTIFY THE INSTALLATION WITH ACCEPTANCE TESTING. THE ELECTRICAL CONTRACTOR SHALL CONDUCT THE ACCEPTANCE TEST WITH THE LOCAL FIRE DEPARTMENT IN ACCORDANCE WITH NFPA 72. TEST INCLUDE BUT MAY NOT BE LIMITED TO THE FOLLOWING: MEGGER (INSULATION) TESTING, LOOP CONTINUITY, GROUND, SHORT, OPEN CIRCUIT, A WRITTEN REPORT SHALL BE SUBMITTED DETAILING THE RESULTS OF THE PRELIMINARY TESTS SHALL ACCOMPANY THE REQUEST FOR FINAL ACCEPTANCE TEST.

FIRE ALARM

TYPICAL DEVICE ANNOTATION:
"15" INDICATES CANDELA RATING

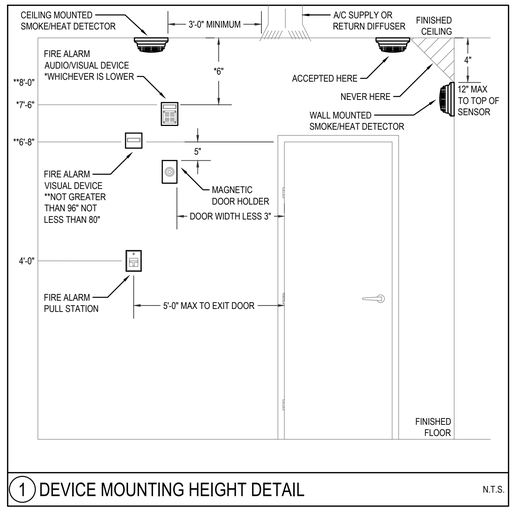
- F 15 — AUDIO / VISUAL DEVICE
  "F" INDICATES HORN / VISUAL
- L 15 — VISUAL ONLY DEVICE
  "L" INDICATES WHITE LENS FOR FIRE
- 15 — CEILING MOUNTED AUDIO / VISUAL DEVICE
  "F" INDICATES HORN / VISUAL
- 15 — CEILING MOUNTED VISUAL ONLY DEVICE
- F — MANUAL PULL STATION
- S R — SMOKE DETECTOR
  "R" INDICATES ELEVATOR RECALL
- H F — HEAT DETECTOR, 135° RATE-OF-RISE TYPE
  "F" INDICATES 190° FIXED TEMPERATURE
- FACP — FIRE ALARM DEVICE
  "FACP" INDICATES FIRE ALARM CONTROL PANEL
  "FABP" INDICATES FIRE ALARM BOOSTER PANEL
  "FATC" INDICATES FIRE ALARM TERMINAL CABINET
  "AES" INDICATES AES MESH NETWORK COMMUNICATOR, COORDINATE TYPE WITH LOCAL FIRE DEPARTMENT
  "ANN" INDICATES FIRE ALARM ANNUNCIATOR PANEL
  "DACT" INDICATES DIGITAL ALARM COMMUNICATOR TRANSMITTER
  "CELL" INDICATES CELLULAR COMMUNICATOR
  "RADIO" INDICATES RADIO COMMUNICATOR
  "CM" INDICATES CONTROL MODULE
  "MM" INDICATES MONITOR MODULE
  "DH" INDICATES MAGNETIC DOOR HOLDER
  "KB" INDICATES KEY BOX
  "RTS" INDICATES REMOTE TEST STATION
  "FSD" INDICATES SMOKE DAMPER
  "BDA" INDICATES BI-DIRECTIONAL AMPLIFIER
  "BAN" INDICATES BI-DIRECTIONAL AMPLIFIER ANNUNCIATOR
  "SCP" INDICATES SMOKE CONTROL PANEL (FURNISHED AND INSTALLED BY M.C.; WIRED BY E.C.)
- F H — FIRE ALARM ANNUNCIATION DEVICE
  "F" INDICATES RED INDICATING BEACON, EXTERIOR MOUNTED, WEATHERPROOF
  "R" INDICATES REMOTE AREA LED INDICATOR

SEQUENCE OF OPERATIONS INPUT / OUTPUT MATRIX

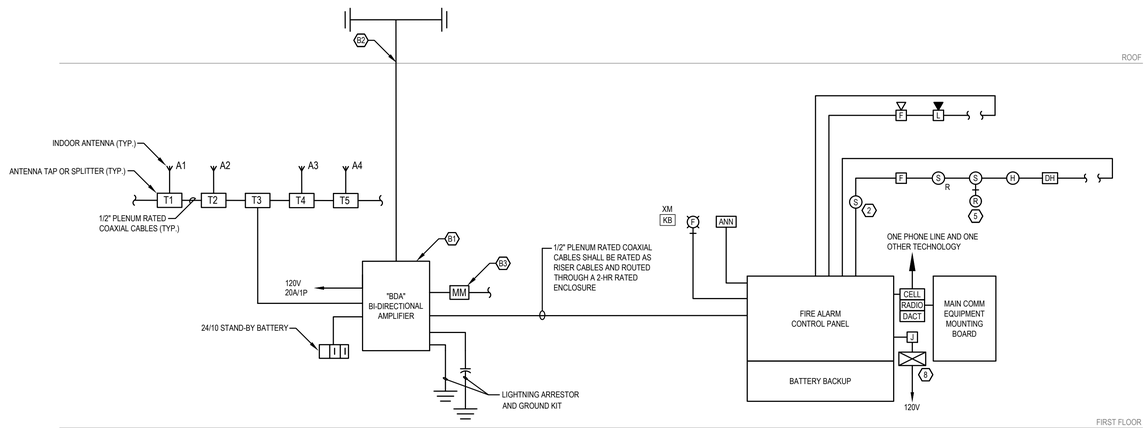
SYSTEM OUTPUTS	CONTROL UNIT ANNUNCIATION								NOTIFICATION											REQUIRE LIFE SAFETY CONTROL	
FIRE ALARM SYSTEM OPERATION SCHEDULE	ACTUATE COMMON ALARM SIGNAL INDICATOR	ACTUATE AUDIBLE ALARM SIGNAL	ACTUATE COMMON SUPERVISORY SIGNAL INDICATOR	ACTUATE AUDIBLE SUPERVISORY SIGNAL	ACTUATE COMMON TROUBLE SIGNAL INDICATOR	ACTUATE AUDIBLE COMMON TROUBLE SIGNAL	ACTUATE FIRE FLOOR ALARM INDICATOR		ACTUATE EVACUATION SIGNALS ON ALL FLOORS	ACTUATE LOCAL AUDIBLE TEMP-3 PATTERN FIRE SIGNAL	ACTUATE LOCAL ADA VISUAL ALARM	ACTUATE ELEVATOR FIRE HAT	DISPLAY/PRINT CHANGE OF STATUS	TRANSMIT FIRE ALARM SIGNAL TO SUPERVISING STATION	TRANSMIT SUPERVISORY SIGNAL TO SUPERVISING STATION	TRANSMIT TROUBLE SIGNAL TO SUPERVISORY STATION	RELEASE MAGNETICALLY HELD SMOKE DOORS	CLOSE FIRE/SMOKE DAMPER ON ASSOCIATED FIRE FLOOR	
SYSTEM INPUTS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R		
1 MANUAL FIRE ALARM BOXES	●	●					●		●	●	●		●	●			●			
2 SMOKE DETECTORS	●	●					●		●	●	●		●	●			●	●		
3 HEAT DETECTORS	●	●					●		●	●	●		●	●			●			
4 FIRE ALARM AC POWER FAILURE					●	●							●			●				
5 FIRE ALARM SYSTEM LOW BATTERY					●	●							●			●				
6 OPEN CIRCUIT					●	●							●			●				
7 GROUND FAULT					●	●							●			●				
8 NOTIFICATION APPLIANCE SHORT CIRCUIT					●	●							●			●				
9 SUPERVISORY			●	●									●		●					
10 TROUBLE					●	●							●			●				

NOTES:

1. ALL EVENTS SHALL BE RECORDED AT THE FIRE ALARM CONTROL PANEL AND SHALL INDICATE TIME AND DATE OF OCCURRENCE AND LIST DEVICE INITIATED.
2. TROUBLE AND SUPERVISORY SIGNALS SHALL BE MONITORED IN ACCORDANCE WITH 780CMR 903.4.1.



1 DEVICE MOUNTING HEIGHT DETAIL N.T.S.



BDA RISER DIAGRAM

N.T.S.

(#) BI-DIRECTIONAL AMPLIFIER RISER DIAGRAM NOTES: PROVIDE SURVEY OF RADIO COVERAGE REVIEWED WITH FIRE DEPARTMENT TO DETERMINE IF BDA IS NECESSARY. PROVIDE ADD ALTERNATE PRICE FOR BDA ASSUMING RADIO COVERAGE DOES NOT PASS.

B1. BI-DIRECTIONAL AMPLIFIER PER LOCAL FIRE DEPARTMENT SPECIFICATIONS EQUAL TO RSI (RADIO SOLUTIONS, INC.) MODEL NO. SB400M2A CLASS B SIGNAL BOOSTER. SYSTEM SHALL INCLUDE: ANTENNA, CABLES, CABLE TAPS OR SPLITTERS, MOUNTING HARDWARE, BATTERY BACK-UP, LIGHTNING ARRESTOR, GROUND KIT AND ANY OTHER ELECTRICAL APPURTENANCES FOR A COMPLETE WORKING SYSTEM.

B2. MOUNTING HARDWARE SHALL BE COORDINATED IN THE FIELD BASED ON THE EXACT LOCATION OF THE DONOR (ROOF) ANTENNA. ANTENNA SHALL FACE SOUTHWEST DIRECTION. ANTENNA MAST GROUNDED/BONDED TO THE BUILDING GROUND.

B3. PROVIDE (5) MONITORING MODULES TO BE CONNECTED TO THE FIRE ALARM CONTROL PANEL:

- BDA ANTENNA FAILURE
- BDA TROUBLE
- BDA POWER LOSS
- BDA CHARGER TROUBLE
- BDA LOW BATTERY

B4. FINAL SYSTEM DIAGRAMS SHALL BE PROVIDED BY THE MANUFACTURER FOR A COMPLETE OPERATIONAL SYSTEM. A BILL OF MATERIAL SHALL BE SUPPLIED WITH THE SYSTEM DESIGN DRAWINGS. IN ORDER TO COMPLY WITH FCC RULES AND SIGNAL COVERAGE REQUIREMENTS, A SIGNAL SURVEY MUST BE PERFORMED PRIOR TO FINAL DESIGN.

- NEW CONSTRUCTION: SURVEY SHALL BE PROVIDED AS THE BUILDING IS SUBSTANTIALLY COMPLETE (ALL WALLS, FLOORS, ROOF ARE CONSTRUCTED).
- EXISTING BUILDINGS: SURVEY SHALL BE PROVIDED IMMEDIATELY.

B5. THE BDA SYSTEM SHALL BE UL 2524 LISTED, PROVIDED AND INSTALLED IN ACCORDANCE WITH NEW HAMPSHIRE STATE BUILDING CODE, NFPA-72, ALL APPLICABLE FCC RULES AND GUIDELINES, TECHNICAL SPECIFICATIONS OF THE LOCAL AUTHORITY HAVING JURISDICTION AND THE MANUFACTURERS QUALITY SPECIFICATIONS.

FIRE ALARM RISER DIAGRAM

N.T.S.

(#) FIRE ALARM RISER DIAGRAM NOTES:

1. ELECTRICAL CONTRACTOR SHALL PROVIDE CIRCUIT BREAKER HANDLE-LOCK ON ALL 120 VOLT FIRE ALARM POWER CIRCUITS. HANDLE LOCK SHALL ALLOW THE CIRCUIT BREAKER TO TRIP, BUT PREVENT SWITCHING OF THE CIRCUIT BREAKER TO THE "OFF" POSITION.
2. PROVIDE SMOKE DETECTOR IN VICINITY (WITHIN 21'-0") OF FIRE ALARM CONTROL PANEL, AND ALL FIRE ALARM BOOSTER PANELS AND COMMUNICATORS. SMOKE DETECTORS IN ELEVATOR LOBBY SHALL BE PROGRAMMED AND/OR PROVIDED WITH ELEVATOR RECALL CAPABILITY.
3. NOT USED.
4. RISER DIAGRAM DOES NOT SHOW ENTIRE SYSTEM. REFER TO FLOOR PLANS FOR EXACT QUANTITIES AND LOCATIONS OF ALL SYSTEM DEVICES.
5. PROVIDE REMOTE ALARM INDICATOR OVER DOOR OF EACH LOCKED ROOM THAT CONTAINS A SMOKE OR HEAT DETECTOR WHETHER OR NOT SHOWN ON THE FLOOR PLANS: SUCH AS, ELEVATOR MACHINE ROOMS, ELECTRIC ROOMS, MECHANICAL ROOMS, IT ROOMS, ETC.
7. PROVIDE 120VOLT POWER AND CONTROL MODULE FOR CONTROL OF SMOKE DAMPER AT TOP OF ELEVATOR SHAFT. DAMPER SHALL BE PROGRAMMED TO OPEN UPON ACTIVATION OF SMOKE DETECTOR AT ELEVATOR MACHINE ROOM, OR AS DIRECTED PROVIDE CONTROL WIRING FROM DAMPER MOTOR TO FIRE ALARM TERMINAL CABINET.
8. PROVIDE A 20AMP, 120VOLT, 1 PHASE SURGE PROTECTOR EQUAL TO MCG SURGE PROTECTION MODEL NO. 415. SURGE PROTECTOR SHALL BE INSTALLED BETWEEN THE CIRCUIT BREAKER IN THE PANEL AND THE FIRE ALARM PANEL, AND IN ACCORDANCE WITH MANUFACTURER'S WIRING RECOMMENDATIONS.
9. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL REQUIRED POWER SUPPLIES FOR A COMPLETE AND OPERABLE SYSTEM. POWER SUPPLY CALCULATIONS SHALL BE INCLUDED IN FIRE ALARM SHOP DRAWINGS.
10. NOT USED.

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FIRE ALARM LEGEND, NOTES, RISERS, AND SPECIFICATIONS

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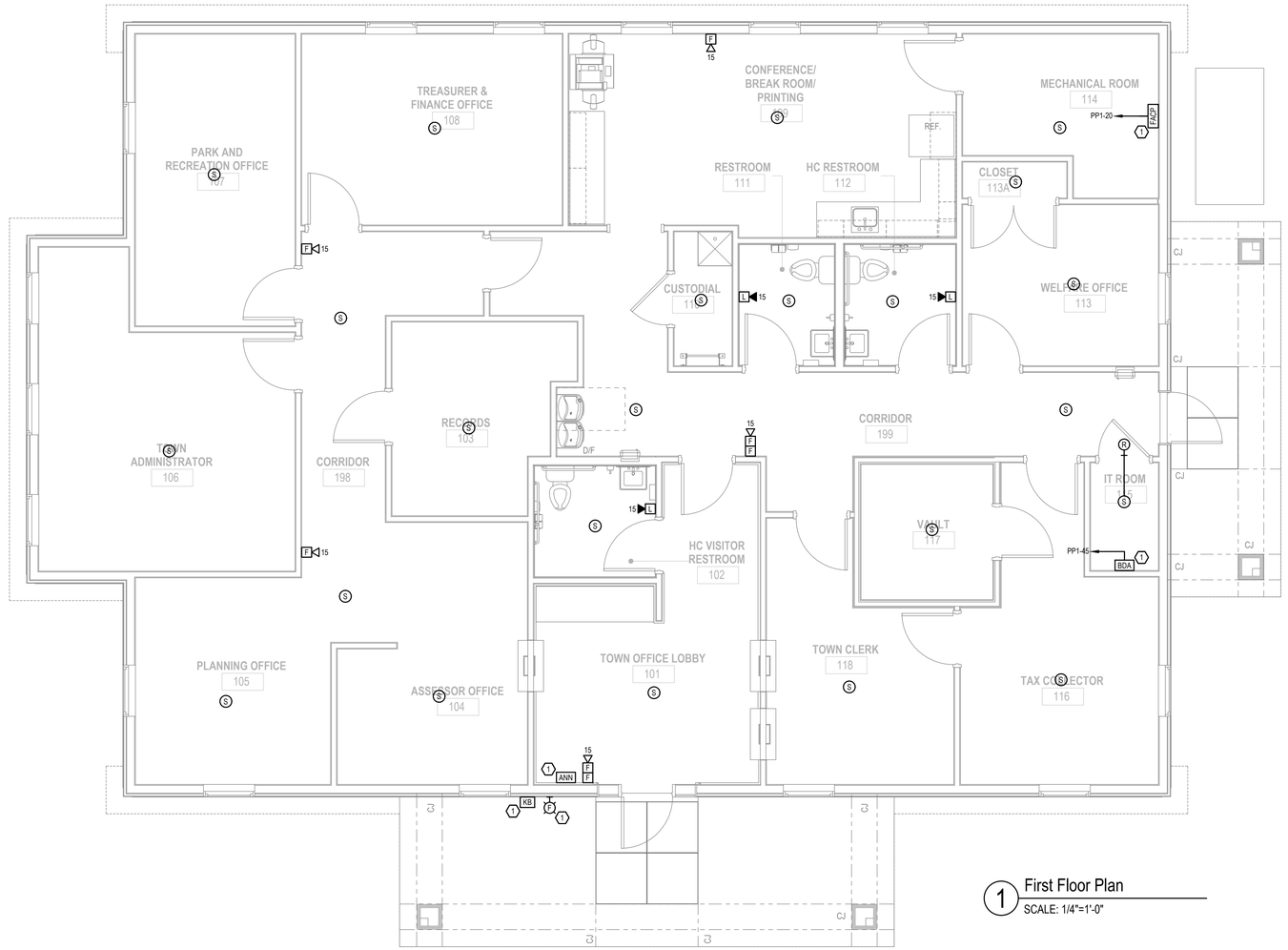

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