

# BSD: OAK HILLS ELEMENTARY T.I.

WASHINGTON COUNTY, OREGON (AHJ)

BEAVERTON SCHOOL DISTRICT

OWNER

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R&W ENGINEERING, INC.

MEP ENGINEER

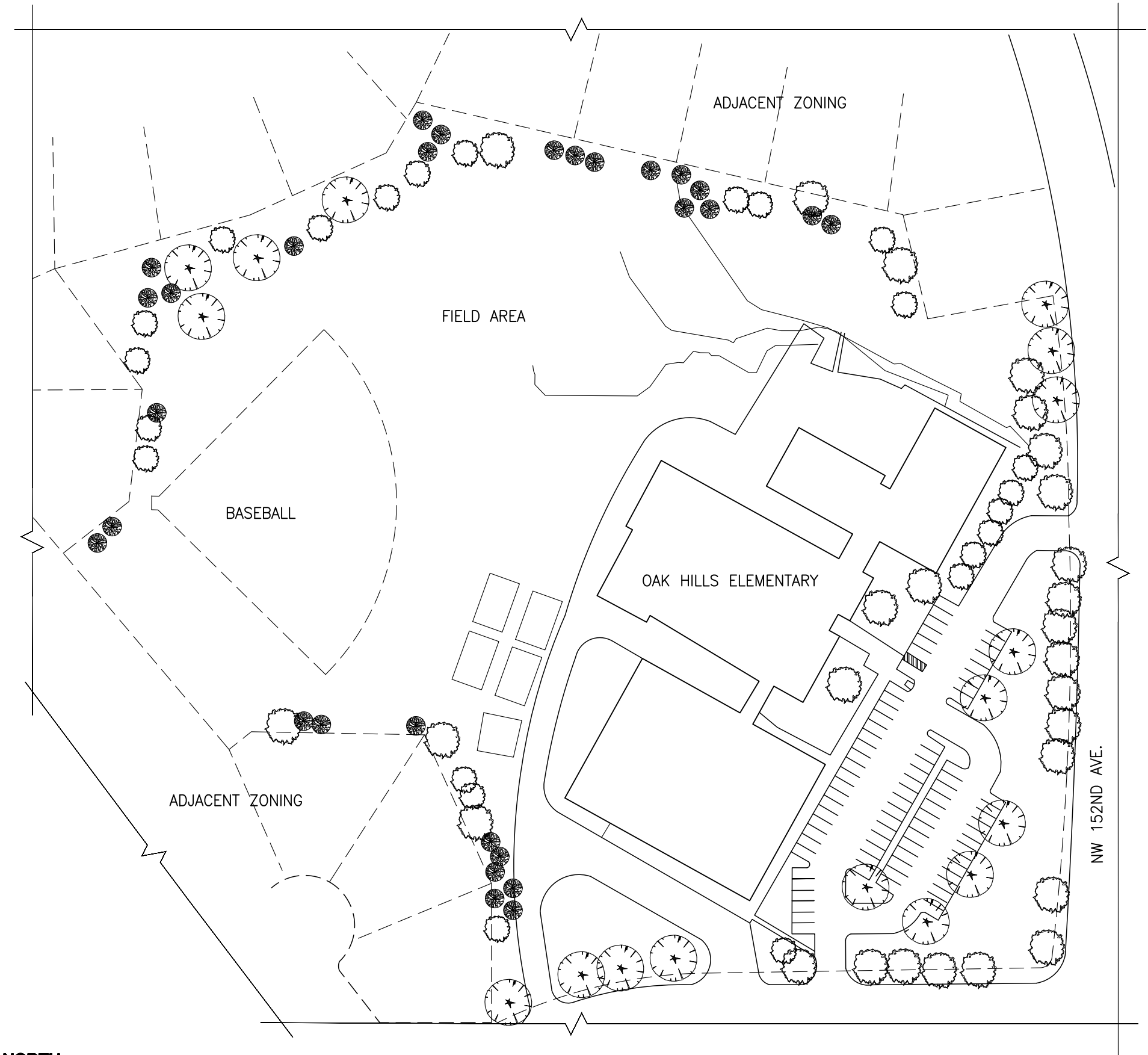
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CONTACT: DWAYNE JOHNSON

TBD

CONTRACTOR

CCB ---

04.21.2020 PERMIT DRAWING SET	3
03.31.2020 REVIEW DRAWING SET	2
03.23.2020 PRELIMINARY DRAWING SET	1
RELEASES	
GENERAL	
CS 1 COVER SHEET & FIRE LIFE SAFETY PLAN	
GN 1 GENERAL NOTES	
ARCHITECTURAL	
T1.1 DEMO PLAN & FLOOR PLAN	
T1.2 REFLECTED CEILING PLAN	
T1.3 TOILET ROOM ELEVATIONS & DETAILS	
ELECTRICAL	
E0.1 SYMBOL & ABBREVIATION- ELECTRICAL	
E1.1 DEMO PLAN- ELECTRICAL	
E1.2 ENLARGED PLAN- ELECTRICAL	
E2.0 ELECTRICAL SPECIFICATIONS	
PLUMBING	
P0.1 COVER SHEET- PLUMBING	
P1.1 DEMO PLUMBING	
P1.2 ENLARGED PLANS	
P2.0 PLUMBING SPECIFICATIONS	
P2.1 PLUMBING SPECIFICATIONS	
P2.2 PLUMBING SPECIFICATIONS	
P2.3 PLUMBING SPECIFICATIONS	
MECHANICAL	
M0.1 COVER SHEET- HVAC	
M1.1 DEMO PLANS	
M1.2 ENLARGED PLANS	
M2.0 MECHANICAL SPECIFICATIONS	



**SITE MAP- FOR REFERENCE ONLY**  
N.T.S.

## PROJECT DESCRIPTION

PROJECT CONSISTS OF INTERIOR IMPROVEMENT TO EXISTING TOILET ROOMS TO MAKE ADA ACCESSIBLE. NO CHANGE TO OCCUPANT LOAD OR PATH OF EGRESS.

## ZONING CODE INFORMATION

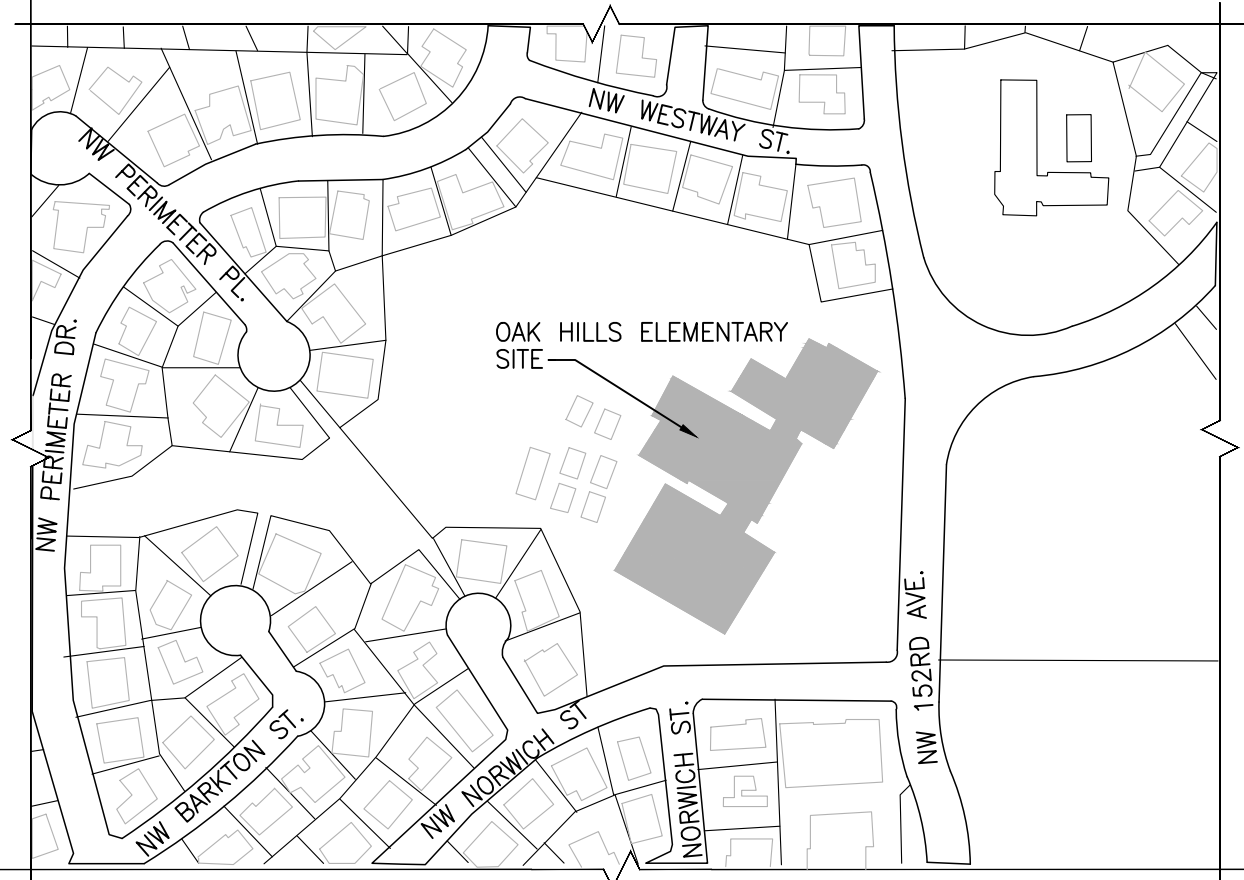
JURISDICTION: WASHINGTON COUNTY  
TAX MAP & LOT: IN129AC-9100  
ZONE: INSTITUTIONAL

## BUILDING CODE SUMMARY

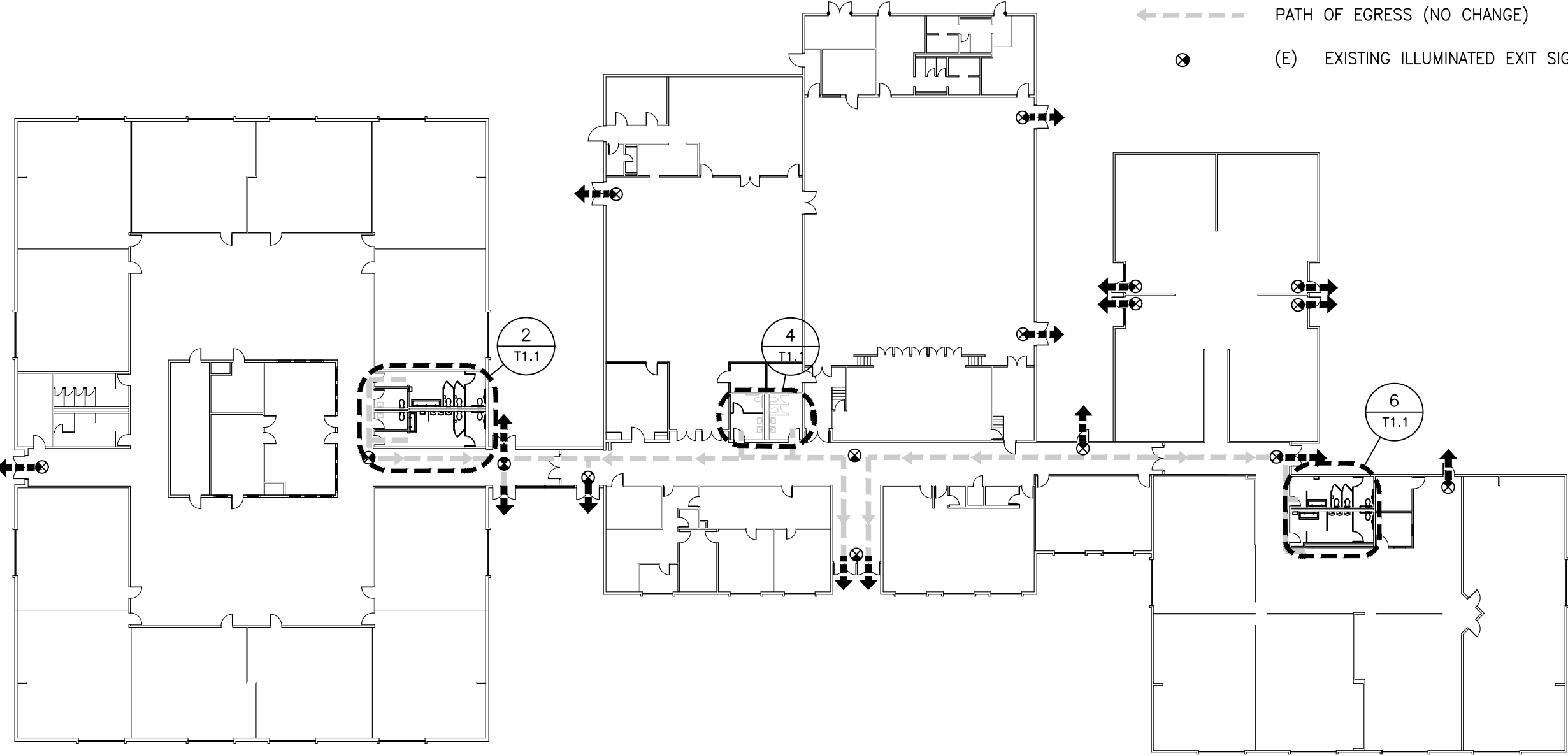
GOVERNING CODE:  
2019 OREGON STRUCTURAL SPECIALTY CODE

OCCUPANCY TYPE: EDUCATION E  
SPRINKLERED VS. NON-SPRINKLERED: SPRINKLERED  
CONSTRUCTION TYPE: V-B

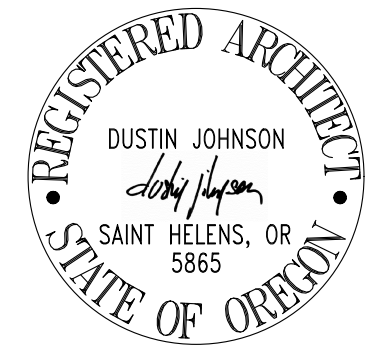
TOTAL EXISTING: 48,144 SF  
TOTAL NEW: 0 SF



**VICINITY MAP**  
NOT TO SCALE



**EGRESS PLAN- FOR REFERENCE ONLY**  
1/32"=1'-0"



1 03/23/2020 PRELIMINARY DRAWING SET  
2 03/31/2020 REVIEW/DRAWING SET  
3 04/21/2020 PERMIT DRAWING SET



TENANT IMPROVEMENT FOR:  
**BSD OAK HILLS ELEMENTARY- TR REMODEL**  
2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

COVER SHEET  
**CS1**  
JOB NO. 20Y007.01  
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REFERENCE BEAVERTON SCHOOL DISTRICT (BSD) TECHNICAL STANDARDS FOR FURTHER SPECIFICATIONS (ARCH/MEP) PROVIDED AT <https://www.beaverton.k12.or.us/depts/facilities/development>. FULLY INCORPORATED. IN CASE OF DISCREPANCIES, CONTRACTOR TO NOTIFY A/E FOR CLARIFICATION.

DIVISION 1 GENERAL REQUIREMENTS

- 1.1 GENERAL CONDITIONS
- A. ALL WORK UNDER THIS CONTRACT TO BE IN ACCORDANCE WITH THE GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION AIA DOCUMENT A201, 2007 EDITION OR OTHER APPROVED FORMAT.
- B. WHERE ANY ARTICLE, PARAGRAPH, SUBPARAGRAPH OR CLAUSE OF THE GENERAL CONDITIONS IS MODIFIED OR DELETED BY THESE SUPPLEMENTS, THE UNALTERED PROVISIONS OF THAT ARTICLE, PARAGRAPH, SUBPARAGRAPH OR CLAUSE SHALL REMAIN IN EFFECT.
- 1.2 INTERPRETATION
- A. VIEWED OR APPROVED BY ARCHITECT/ENGINEER SHALL MEAN WRITTEN REVIEW OR APPROVAL BY ARCHITECT/ENGINEER OR AN AUTHORIZED CONSULTANT.
- B. REFERENCE IN THE SPECIFICATIONS TO A SINGLE ITEM OR PIECE OF EQUIPMENT SHALL APPLY TO AS MANY SUCH ITEMS AS ARE INDICATED ON DRAWINGS OR REQUIRED TO COMPLETE THE PROJECT.
- C. INDICATING AN ITEM OR METHOD ON THE DRAWINGS REQUIRES THE CONTRACTOR TO FURNISH, FABRICATE AND INSTALL THE ITEM, UNLESS INDICATED OTHERWISE.
- 1.3 FEES
- A. UNLESS OTHERWISE INDICATED IN THE CONTRACT DOCUMENTS, THE OWNER SHALL PAY FOR PLAN CHECK FEES AND BUILDING PERMIT FEES, INCLUDING SEWER, GAS AND WATER CONNECTION FEES, AS WELL AS OTHER ASSESSMENTS OR FEES ESTABLISHED BY THE AUTHORITY HAVING JURISDICTION; THE CONTRACTOR SHALL PAY FOR ALL OTHER PERMITS, FEES, LICENSES AND INSPECTIONS NECESSARY FOR PROPER EXECUTION AND COMPLETION OF WORK, INCLUDING PLUMBING, MECHANICAL AND ELECTRICAL PERMIT FEES.
- 1.4 SUBSTITUTIONS
- A. SUBSTITUTION REQUESTS: SUBMIT THREE COPIES OF EACH REQUEST FOR CONSIDERATION. IDENTIFY PRODUCT OR FABRICATION OR INSTALLATION METHOD TO BE REPLACED. INCLUDE SPECIFICATION SECTION NUMBER AND TITLE AND DRAWING NUMBERS AND TITLES.
- B. SUBSTITUTIONS FOR CAUSE: SUBMIT REQUESTS FOR SUBSTITUTION IMMEDIATELY UPON DISCOVERY OF NEED FOR CHANGE, BUT NOT LATER THAN 15 DAYS PRIOR TO TIME REQUIRED FOR PREPARATION AND REVIEW OF RELATED SUBMITTALS.
- C. SUBSTITUTIONS FOR CONVENIENCE: ARCHITECT WILL CONSIDER REQUESTS FOR SUBSTITUTION IF RECEIVED WITHIN 60 DAYS AFTER THE NOTICE OF AWARD.
- 1.5 SUBMITTALS
- A. SHOP DRAWINGS: PREPARE PROJECT-SPECIFIC INFORMATION, DRAWN ACCURATELY TO SCALE. DO NOT BASE SHOP DRAWINGS OR REPRODUCTIONS OF THE CONTRACT DOCUMENTS OR STANDARD PRINTED DATA, UNLESS SUBMITTAL BASED UPON ARCHITECT'S DIGITAL DATA DRAWING FILES IS OTHERWISE PERMITTED.
- B. SAMPLES: SUBMIT SAMPLES FOR REVIEW OF KIND, COLOR, PATTERN, AND TEXTURE FOR A CHECK OF THESE CHARACTERISTICS WITH OTHER ELEMENTS AND FOR A COMPARISON OF THESE CHARACTERISTICS BETWEEN SUBMITTAL AND ACTUAL COMPONENT AS DELIVERED AND INSTALLED.
- C. PRODUCT DATA: COLLECT INFORMATION INTO A SINGLE SUBMITTAL FOR EACH ELEMENT OF CONSTRUCTION AND TYPE OF PRODUCT OR EQUIPMENT.
- 1.6 DELEGATED-DESIGN SERVICES (DESIGN BUILD)
- 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.
- B. DELEGATED-DESIGN SERVICES CERTIFICATION: IN ADDITION TO SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS, SUBMIT DIGITALLY-SIGNED PDF ELECTRONIC FILE AND THREE PAPER COPIES FOR EACH PRODUCT AND SYSTEM SPECIFICALLY ASSIGNED TO CONTRACTOR TO BE DESIGNED OR CERTIFIED BY A DESIGN PROFESSIONAL.
- C. 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.
- 1.7 EXECUTION REQUIREMENTS
- A. CUTTING AND PATCHING: COMPLY WITH REQUIREMENTS FOR AND LIMITATIONS ON CUTTING AND PATCHING OF CONSTRUCTION ELEMENTS.
1. STRUCTURAL ELEMENTS: WHEN CUTTING AND PATCHING STRUCTURAL ELEMENTS, NOTIFY ARCHITECT OF LOCATIONS AND DETAILS OF CUTTING AND AWAY DIRECTIONS FROM THE ARCHITECT BEFORE PROCEEDING. SHORE, BRACE, AND SUPPORT STRUCTURAL ELEMENT DURING CUTTING AND PATCHING. DO NOT CUT AND PATCH STRUCTURAL ELEMENTS IN A MANNER THAT COULD CHANGE THEIR LOAD-CARRYING CAPACITY OR INCREASE DEFLECTION.
2. OPERATIONAL ELEMENTS: DO NOT CUT AND PATCH OPERATING ELEMENTS AND RELATED COMPONENTS IN A MANNER THAT RESULTS IN REDUCING THEIR CAPACITY TO PERFORM AS INTENDED OR THAT RESULTS IN INCREASED MAINTENANCE OR DECREASED OPERATIONAL LIFE OR SAFETY.
3. OTHER CONSTRUCTION ELEMENTS: DO NOT CUT AND PATCH OTHER CONSTRUCTION ELEMENTS OR COMPONENTS IN A MANNER THAT COULD CHANGE THEIR LOAD-CARRYING CAPACITY, THAT RESULTS IN REDUCING THEIR CAPACITY TO PERFORM AS INTENDED, OR THAT RESULTS IN INCREASED MAINTENANCE OR DECREASED OPERATIONAL LIFE OR SAFETY.
4. VISUAL ELEMENTS: DO NOT CUT AND PATCH CONSTRUCTION IN A MANNER THAT RESULTS IN VISUAL EVIDENCE OF CUTTING AND PATCHING. DO NOT CUT AND PATCH EXPOSED CONSTRUCTION IN A MANNER THAT WOULD, IN ARCHITECT'S OPINION, REDUCE THE BUILDING'S AESTHETIC QUALITIES. REMOVE AND REPLACE CONSTRUCTION THAT HAS BEEN CUT AND PATCHED IN A VISUALLY UNSATISFACTORY MANNER.
- B. EXISTING CONDITIONS: THE EXISTENCE AND LOCATION OF UNDERGROUND AND OTHER UTILITIES AND CONSTRUCTION INDICATED AS EXISTING ARE NOT GUARANTEED. BEFORE BEGINNING SITEWORK, INVESTIGATE AND VERIFY THE EXISTENCE AND LOCATION OF UNDERGROUND UTILITIES, MECHANICAL AND ELECTRICAL SYSTEMS, AND OTHER CONSTRUCTION AFFECTING THE WORK.
- C. BEFORE CONSTRUCTION, VERIFY THE LOCATION AND INVERT ELEVATION AT POINTS OF CONNECTION OF SANITARY SEWER, STORM SEWER, AND WATER-SERVICE PIPING; UNDERGROUND ELECTRICAL SERVICES, AND OTHER UTILITIES.
- D. SITE IMPROVEMENTS: LOCATE AND LAY OUT SITE IMPROVEMENTS, INCLUDING PAVEMENTS, GRADING, FILL AND TOPSOIL PLACEMENT, UTILITY SLOPES, AND RIM AND INVERT ELEVATIONS.
- E. BUILDING LINES AND LEVELS: LOCATE AND LAY OUT CONTROL LINES AND LEVELS FOR STRUCTURES, BUILDING FOUNDATIONS, COLUMN GRIDS, AND FLOOR LEVELS, INCLUDING THOSE REQUIRED FOR MECHANICAL AND ELECTRICAL WORK. TRANSFER SURVEY MARKINGS AND ELEVATIONS FOR USE WITH CONTROL LINES AND LEVELS. LEVEL FOUNDATIONS AND PIERS FROM TWO OR MORE LOCATIONS.
- F. TEMPORARY SUPPORT: PROVIDE TEMPORARY SUPPORT OF WORK TO BE CUT.
- G. PROTECTION: PROTECT IN-PLACE CONSTRUCTION DURING CUTTING AND PATCHING TO PREVENT DAMAGE. PROVIDE PROTECTION FROM ADVERSE WEATHER CONDITIONS FOR PORTIONS OF PROJECT THAT MIGHT BE EXPOSED DURING CUTTING AND PATCHING OPERATIONS.
- H. ADJACENT OCCUPIED AREAS: AVOID INTERFERENCE WITH USE OF ADJOINING AREAS OR INTERRUPTION OF FREE PASSAGE TO ADJOINING AREAS.
- I. EXISTING UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS: WHERE EXISTING SERVICES/SYSTEMS ARE REQUIRED TO BE REMOVED, RELOCATED, OR ABANDONED, BYPASS SUCH SERVICES/SYSTEMS BEFORE CUTTING TO MINIMIZE INTERRUPTION TO OCCUPIED AREAS.
- J. CUTTING: CUT IN-PLACE CONSTRUCTION BY SAWING, DRILLING, BREAKING, CHIPPING, GRINDING, AND SIMILAR OPERATIONS, INCLUDING EXCAVATION, USING METHODS LEAST LIKELY TO DAMAGE ELEMENTS RETAINED OR ADJOINING CONSTRUCTION. IF POSSIBLE, REVIEW PROPOSED PROCEDURES WITH ORIGINAL INSTALLER; COMPLY WITH ORIGINAL INSTALLER'S WRITTEN RECOMMENDATIONS.
- K. PATCHING: PATCH CONSTRUCTION BY FILLING, REPAIRING, REFINISHING, CLOSING UP, AND SIMILAR OPERATIONS FOLLOWING PERFORMANCE OF OTHER WORK. PATCH WITH DURABLE SEAMS THAT ARE AS INVISIBLE AS PRACTICABLE. PROVIDE MATERIALS AND COMPLY WITH INSTALLATION REQUIREMENTS SPECIFIED IN OTHER SECTIONS, WHERE APPLICABLE.
- L. CLEANING: CLEAN PROJECT SITE AND WORK AREAS DAILY, INCLUDING COMMON AREAS. ENFORCE REQUIREMENTS STRICTLY. DISPOSE OF MATERIALS LAWFULLY.
- M. PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS THAT ENSURE INSTALLED WORK IS WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION.

DIVISION 2 EXISTING CONDITIONS

- 2.1 SELECTIVE DEMOLITION
- A. GENERAL: DEMOLISH AND REMOVE EXISTING CONSTRUCTION ONLY TO THE EXTENT REQUIRED BY NEW CONSTRUCTION AND AS INDICATED. USE METHODS REQUIRED TO COMPLETE THE WORK WITHIN LIMITATIONS OF GOVERNING REGULATIONS AND AS FOLLOWS:

1. NEATLY CUT OPENINGS AND HOLES PLUMB, SQUARE, AND TRUE TO DIMENSIONS REQUIRED. USE CUTTING METHODS LEAST LIKELY TO DAMAGE CONSTRUCTION TO REMAIN OR ADJOINING CONSTRUCTION. USE HAND TOOLS OR SMALL POWER TOOLS DESIGNED FOR SAWING OR GRINDING, NOT HAMMERING AND CHIPPING, TO MINIMIZE DISTURBANCE OF ADJACENT SURFACES. TEMPORARILY COVER OPENINGS TO REMAIN.
2. CUT OR DRILL FROM THE EXPOSED OR FINISHED SIDE INTO CONCEALED SURFACES TO AVOID MARRING EXISTING FINISHED SURFACES.
3. DO NOT USE CUTTING TORCHES UNTIL WORK AREA IS CLEARED OF FLAMMABLE MATERIALS. AT CONCEALED SPACES, SUCH AS DUCT AND PIPE INTERIORS, VERIFY CONDITION AND CONTENTS OF HIDDEN SPACES BEFORE STARTING FLAME-CUTTING OPERATIONS. MAINTAIN WATCH AND PORTABLE FIRE-SUPPRESSION DEVICES DURING FLAME-CUTTING OPERATIONS.
4. LOCATE SELECTIVE DEMOLITION EQUIPMENT AND REMOVE DEBRIS AND MATERIALS SO AS NOT TO IMPOSE EXCESSIVE LOADS ON SUPPORTING WALLS, FLOORS, OR FRAMING.
5. DISPOSE OF DEMOLISHED ITEMS AND MATERIALS PROMPTLY.
- B. REUSE OF BUILDING ELEMENTS: PROJECT HAS BEEN DESIGNED TO RESULT IN END-OF-PROJECT RATES FOR REUSE OF BUILDING ELEMENTS AS FOLLOWS. DO NOT DEMOLISH BUILDING ELEMENTS BEYOND WHAT IS INDICATED ON DRAWINGS WITHOUT ARCHITECT'S APPROVAL.
- C. REMOVED AND SALVAGED ITEMS:
1. CLEAN SALVAGED ITEMS: PACK OR CRATE ITEMS AFTER CLEANING. IDENTIFY CONTENTS OF CONTAINERS.
2. STORE ITEMS IN A SECURE AREA UNTIL DELIVERY TO OWNER.
3. PROTECT ITEMS FROM DAMAGE DURING TRANSPORT AND STORAGE.
- D. REMOVED AND REINSTALLED ITEMS: CLEAN AND REPAIR ITEMS TO FUNCTIONAL CONDITION ADEQUATE FOR INTENDED REUSE. PAINT EQUIPMENT TO MATCH NEW EQUIPMENT.
1. PACK OR CRATE ITEMS AFTER CLEANING AND REPAIRING. IDENTIFY CONTENTS OF CONTAINERS.
2. PROTECT ITEMS FROM DAMAGE DURING TRANSPORT AND STORAGE.
3. REINSTALL ITEMS IN LOCATIONS INDICATED. COMPLY WITH INSTALLATION REQUIREMENTS FOR NEW MATERIALS AND EQUIPMENT. PROVIDE CONNECTIONS, SUPPORTS, AND MISCELLANEOUS MATERIALS NECESSARY TO MAKE ITEM FUNCTIONAL FOR USE INDICATED.
- E. EXISTING ITEMS TO REMAIN: PROTECT CONSTRUCTION INDICATED TO REMAIN AGAINST DAMAGE AND SOILING DURING SELECTIVE DEMOLITION. WHEN PERMITTED BY ARCHITECT, ITEMS MAY BE REMOVED TO A SUITABLE, PROTECTED STORAGE LOCATION DURING SELECTIVE DEMOLITION CLEARED AND REINSTALLED IN THEIR ORIGINAL LOCATIONS AFTER SELECTIVE DEMOLITION OPERATIONS ARE COMPLETE.

DIVISION 6 WOOD, PLASTICS AND COMPOSITES

- 6.1 ROUGH CARPENTRY
- A. GENERAL: ALL LUMBER AND PLYWOOD TO BE GRADE MARKED IN ACCORDANCE WITH ONE OF THE FOLLOWING AGENCIES: WEST COAST LUMBER INSPECTION BUREAU "STANDARD GRADING RULES FOR WEST COAST LUMBER", WESTERN WOOD PRODUCTS ASSOCIATION "GRADING RULES FOR WESTERN LUMBER" OR AMERICAN WOOD ASSOCIATION.
- B. ALL NAILING TO BE IN ACCORDANCE WITH OSGC 2010 TABLE 2304.9.1, UNLESS NOTED OTHERWISE.
- C. ALL FRAMING HARDWARE IN CONTACT WITH PRESSURE TREATED LUMBER TO BE HOT DIPPED GALVANIZED.
- D. LUMBER GRADES:
1. ALL SOLID SAWN LUMBER GRADES NOT SPECIFIED TO BE DF#2 OR BETTER.
2. ALL WOOD IN PERMANENT CONTACT WITH CONCRETE TO BE PRESSURE TREATED.

DIVISION 7 THERMAL AND MOISTURE PROTECTION

- 7.6 SEALANTS
- A. PRECONSTRUCTION TESTING
1. PRECONSTRUCTION COMPATIBILITY AND ADHESION TESTING: USE MANUFACTURER'S STANDARD TEST METHOD TO DETERMINE WHETHER PRIMING AND OTHER JOINT SPECIFIC JOINT PREPARATION TECHNIQUES ARE REQUIRED TO OBTAIN RAPID, OPTIMUM ADHESION OF JOINT SEALANTS TO JOINT SUBSTRATES.
2. PRECONSTRUCTION FIELD-ADHESION TESTING: BEFORE INSTALLING SEALANTS, FIELD TEST THEIR ADHESION TO PROJECT JOINT SUBSTRATES. TEST JOINT SEALANTS ACCORDING TO METHOD A, FIELD-APPLIED SEALANT JOINT HAND PULL TAB, IN APPENDIX X1 IN ASTM C 1193 OR METHOD A, TAIL PROCEDURE, IN ASTM C 1521.
3. TESTING AGENCY QUALIFICATIONS: QUALIFIED ACCORDING TO ASTM C 1021 TO CONDUCT THE TESTING INDICATED.
- B. WARRANTY
1. SPECIAL INSTALLER'S WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH INSTALLER AGREES TO REPAIR OR REPLACE JOINT SEALANTS THAT DO NOT COMPLY WITH PERFORMANCE AND OTHER REQUIREMENTS SPECIFIED IN THIS SECTION WITHIN SPECIFIED WARRANTY PERIOD (TWO YEARS FROM DATE OF SUBSTANTIAL COMPLETION).
2. SPECIAL MANUFACTURER'S WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH JOINT-SEALANT MANUFACTURER AGREES TO FURNISH JOINT SEALANTS TO REPAIR OR REPLACE THOSE THAT DO NOT COMPLY WITH PERFORMANCE AND OTHER REQUIREMENTS SPECIFIED IN THIS SECTION WITHIN SPECIFIED WARRANTY PERIOD (TWO YEARS FROM DATE OF SUBSTANTIAL COMPLETION).
- C. SILICONE JOINT SEALANTS
1. MILDEW-RESISTANT NEUTRAL-CURING SILICONE JOINT SEALANT : ASTM C 920.
2. TYPE: SINGLE COMPONENT (S).
3. GRADE: [NONSAG (NS)].
4. CLASS: 100/50.
5. USES RELATED TO EXPOSURE: NONTRAFFIC (NT).
- D. ACOUSTICAL JOINT SEALANTS
1. ACOUSTICAL JOINT SEALANT: MANUFACTURER'S STANDARD NONSAG, PAINTABLE, NONSTAINING LATEX SEALANT COMPLYING WITH ASTM C 834. PRODUCT EFFECTIVELY REDUCES AIRBORNE SOUND TRANSMISSION THROUGH PERIMETER JOINTS AND OPENINGS IN BUILDING CONSTRUCTION AS DEMONSTRATED BY TESTING REPRESENTATIVE ASSEMBLIES ACCORDING TO ASTM E 90.
- E. JOINT SEALANT BACKING
1. CYLINDRICAL SEALANT BACKINGS: ASTM C 1330, TYPE C (CLOSED-CELL MATERIAL WITH A SURFACE SKIN), TYPE O (OPEN-CELL MATERIAL), TYPE B (BICELLULAR MATERIAL WITH A SURFACE SKIN), OR ANY OF THE PRECEDING TYPES, AS APPROVED IN WRITING BY JOINT-SEALANT MANUFACTURER FOR JOINT APPLICATION INDICATED, AND OF SIZE AND DENSITY TO CONTROL SEALANT DEPTH AND OTHERWISE CONTRIBUTE TO PRODUCING OPTIMUM SEALANT PERFORMANCE.
2. BOND-BREAKER TAPE: POLYETHYLENE TAPE OR OTHER PLASTIC TAPE RECOMMENDED BY SEALANT MANUFACTURER.
- F. MISCELLANEOUS MATERIALS
1. PRIMER: MATERIAL RECOMMENDED BY JOINT-SEALANT MANUFACTURER WHERE REQUIRED FOR ADHESION OF SEALANTS 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.
3. MASKING TAPE: NONSTAINING, NONABSORBENT MATERIAL COMPATIBLE WITH JOINT SEALANTS AND SURFACES ADJACENT TO JOINTS.
- G. SURFACE CLEANING OF JOINTS: CLEAN OUT JOINTS IMMEDIATELY BEFORE INSTALLING JOINT SEALANTS TO COMPLY WITH JOINT-SEALANT MANUFACTURER'S WRITTEN INSTRUCTIONS.
1. REMOVE LAITANCE AND FORM-RELEASE AGENTS FROM CONCRETE.
2. CLEAN NONPOROUS JOINT SUBSTRATE SURFACES WITH CHEMICAL CLEANERS OR OTHER MEANS THAT DO NOT STAIN, HARM SUBSTRATES, OR LEAVE RESIDUES CAPABLE OF INTERFERING WITH ADHESION OF JOINT SEALANTS.
3. JOINT PRIMING: PRIME JOINT SUBSTRATES WHERE RECOMMENDED BY JOINT-SEALANT MANUFACTURER OR AS INDICATED BY PRECONSTRUCTION JOINT-SEALANT-SUBSTRATE TESTS OR PRIOR EXPERIENCE. APPLY PRIMER TO COMPLY WITH JOINT-SEALANT MANUFACTURER'S WRITTEN INSTRUCTIONS. CONFINE PRIMERS TO AREAS OF JOINT-SEALANT BOND; DO NOT ALLOW SPILLAGE OR MIGRATION ONTO ADJOINING SURFACES.
4. MASKING TAPE: USE MASKING TAPE WHERE REQUIRED TO PREVENT CONTACT OF SEALANT OR PRIMER WITH ADJOINING SURFACES THAT OTHERWISE WOULD BE PERMANENTLY STAINED OR DAMAGED BY SUCH CONTACT OR BY CLEANING METHODS REQUIRED TO REMOVE SEALANT SMEARS. REMOVE TAPE IMMEDIATELY AFTER TOOLING WITHOUT DISTURBING JOINT SEAL.
- H. INSTALLATION
1. SEALANT INSTALLATION STANDARD: COMPLY WITH RECOMMENDATIONS IN ASTM C 1193 FOR USE OF JOINT SEALANTS AS APPLICABLE TO MATERIALS, APPLICATIONS, AND CONDITIONS INDICATED.
2. INSTALL SEALANT BACKINGS OF KIND INDICATED TO SUPPORT SEALANTS DURING APPLICATION AND AT POSITION REQUIRED TO PRODUCE CROSS-SECTIONAL SHAPES AND DEPTHS OF INSTALLED SEALANTS RELATIVE TO JOINT WIDTHS THAT ALLOW OPTIMUM SEALANT MOVEMENT CAPABILITY.
3. DO NOT LEAVE GAPS BETWEEN ENDS OF SEALANT BACKINGS.
4. DO NOT STRETCH, TWIST, PUNCTURE, OR TEAR SEALANT BACKINGS.
5. REMOVE ABSORBENT SEALANT BACKINGS THAT HAVE BECOME WET BEFORE SEALANT APPLICATION AND REPLACE THEM WITH DRY MATERIALS.
- I. INSTALL BOND-BREAKER TAPE BEHIND SEALANTS WHERE SEALANT BACKINGS ARE NOT USED BETWEEN SEALANTS AND BACKS OF JOINTS.
- J. INSTALL SEALANTS USING PROVEN TECHNIQUES THAT COMPLY WITH THE FOLLOWING AND AT THE SAME TIME BACKINGS ARE INSTALLED:
1. PLACE SEALANTS SO THEY DIRECTLY CONTACT AND FULLY WET JOINT SUBSTRATES.
2. COMPLETELY FILL RECESSES IN EACH JOINT CONFIGURATION.
3. PRODUCE UNIFORM, CROSS-SECTIONAL SHAPES AND DEPTHS RELATIVE TO JOINT WIDTHS THAT ALLOW OPTIMUM SEALANT MOVEMENT CAPABILITY.

- K. TOOLING OF NONSAG SEALANTS: IMMEDIATELY AFTER SEALANT APPLICATION AND BEFORE SKINNING OR CURING BEGINS, TOOL SEALANTS ACCORDING TO REQUIREMENTS SPECIFIED IN SUBPARAGRAPHS BELOW TO FORM SMOOTH, UNIFORM BEADS OF CONFIGURATION INDICATED; TO ELIMINATE AIR POCKETS, AND TO ENSURE CONTACT AND ADHESION OF SEALANT WITH SIDES OF JOINT.
1. REMOVE EXCESS SEALANT FROM SURFACES ADJACENT TO JOINTS.
2. USE TOOLING AGENTS THAT ARE APPROVED IN WRITING BY SEALANT MANUFACTURER AND THAT DO NOT DISCOLOR SEALANTS OR ADJACENT SURFACES.
3. PROVIDE CONCAVE JOINT PROFILE PER FIGURE 8A IN ASTM C 1193, UNLESS OTHERWISE INDICATED.
- L. ACOUSTICAL SEALANT INSTALLATION: COMPLY WITH ASTM C 919 AND WITH MANUFACTURER'S WRITTEN RECOMMENDATIONS.
- M. CLEAN OFF EXCESS SEALANT OR SEALANT SMEARS ADJACENT TO JOINTS AS THE WORK PROGRESSES BY METHODS AND WITH CLEANING MATERIALS APPROVED IN WRITING BY MANUFACTURERS OF JOINT SEALANTS AND OF PRODUCTS IN WHICH JOINTS OCCUR.
- N. FIELD-ADHESION TESTING: FIELD TEST JOINT-SEALANT ADHESION TO JOINT SUBSTRATES AS FOLLOWS:
1. PERFORM 10 TESTS FOR THE FIRST 1000 FEET OF JOINT LENGTH FOR EACH KIND OF SEALANT AND JOINT SUBSTRATE.
2. PERFORM 1 TEST FOR EACH 1000 FEET OF JOINT LENGTH THEREAFTER OR 1 TEST PER EACH FLOOR PER ELEVATION.
3. TEST METHOD: TEST JOINT SEALANTS ACCORDING TO METHOD A, FIELD-APPLIED SEALANT JOINT HAND PULL TAB, IN APPENDIX X1 IN ASTM C 1193 OR METHOD A, TAIL PROCEDURE, IN ASTM C 1521.
4. EVALUATION OF FIELD-ADHESION TEST RESULTS: SEALANTS NOT EVIDENCING ADHESIVE FAILURE FROM TESTING OR NONCOMPLIANCE WITH OTHER INDICATED REQUIREMENTS WILL BE CONSIDERED SATISFACTORY. REMOVE SEALANTS THAT FAIL TO ADHERE TO JOINT SUBSTRATES DURING TESTING OR TO COMPLY WITH OTHER REQUIREMENTS. RETEST FAILED APPLICATIONS UNTIL TEST RESULTS PROVE SEALANTS COMPLY WITH INDICATED REQUIREMENTS.
- O. INTERIOR JOINTS IN HORIZONTAL TRAFFIC SURFACES
1. CONTROL AND EXPANSION JOINTS IN TILE FLOORING.
2. OTHER JOINTS AS INDICATED.
3. JOINT SEALANT: URETHANE.
4. JOINT-SEALANT COLOR: AS SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE OF COLORS.
- P. INTERIOR JOINTS IN VERTICAL SURFACES AND HORIZONTAL NONTRAFFIC SURFACES.
1. VERTICAL JOINTS ON EXPOSED SURFACES OF WALLS AND PARTITIONS.
2. PERIMETER JOINTS BETWEEN INTERIOR WALL SURFACES AND FRAMES OF INTERIOR DOORS AND WINDOWS.
3. OTHER JOINTS AS INDICATED.
4. JOINT SEALANT: LATEX.
5. JOINT-SEALANT COLOR: AS SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE OF COLORS.
- Q. MILDEW-RESISTANT INTERIOR JOINTS IN VERTICAL SURFACES AND HORIZONTAL NONTRAFFIC SURFACES.
1. JOINTS BETWEEN PLUMBING FIXTURES AND ADJOINING WALLS, FLOORS, AND COUNTERS.
2. TILE CONTROL AND EXPANSION JOINTS WHERE INDICATED.
3. OTHER JOINTS AS INDICATED.
4. JOINT SEALANT: SILICONE.
5. JOINT-SEALANT COLOR: AS SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE OF COLORS.
- R. JOINT-SEALANT APPLICATION: INTERIOR ACOUSTICAL JOINTS IN VERTICAL SURFACES AND HORIZONTAL NONTRAFFIC SURFACES.
1. ACOUSTICAL JOINTS WHERE INDICATED.
2. OTHER JOINTS AS INDICATED.
3. JOINT SEALANT: ACOUSTICAL.
4. JOINT-SEALANT COLOR: AS SELECTED BY ARCHITECT FROM MANUFACTURER'S FULL RANGE OF COLORS.

DIVISION 9 FINISHES

- 9.1 NON-STRUCTURAL METAL FRAMING
- A. FRAMING MEMBERS, GENERAL: COMPLY WITH ASTM C 754 FOR CONDITIONS INDICATED.
- B. STEEL SHEET COMPONENTS: COMPLY WITH ASTM C 645 REQUIREMENTS FOR METAL, UNLESS OTHERWISE INDICATED.
- C. PROTECTIVE COATING: MANUFACTURER'S STANDARD CORROSION-RESISTANT ZINC COATING, UNLESS OTHERWISE INDICATED.
- D. TIE WIRE: ASTM A 641/A 641M, CLASS 1 ZINC COATING, SOFT TEMPER, 0.0625-INCH- (1.59-MM-) DIAMETER WIRE, OR DOUBLE STRAND OF 0.0475-INCH- (1.21-MM-) DIAMETER WIRE.
- E. HANGER ATTACHMENTS TO CONCRETE:
1. ANCHORS: FABRICATED FROM CORROSION-RESISTANT MATERIALS WITH HOLES OR LOOPS FOR ATTACHING WIRE HANGERS AND CAPABLE OF SUSTAINING, WITHOUT FAILURE, A LOAD EQUAL TO 5 TIMES THAT IMPOSED BY CONSTRUCTION AS DETERMINED BY TESTING ACCORDING TO ASTM E 488 BY AN INDEPENDENT TESTING AGENCY.
2. POWDER-ACTUATED FASTENERS: SUITABLE FOR APPLICATION INDICATED, FABRICATED FROM CORROSION-RESISTANT MATERIALS WITH CLIPS OR OTHER DEVICES FOR ATTACHING HANGERS OF TYPE INDICATED, AND CAPABLE OF SUSTAINING, WITHOUT FAILURE, A LOAD EQUAL TO 10 TIMES THAT IMPOSED BY CONSTRUCTION AS DETERMINED BY TESTING ACCORDING TO ASTM E 1190 BY AN INDEPENDENT TESTING AGENCY.
3. WIRE HANGERS: ASTM A 641/A 641M, CLASS 1 ZINC COATING, SOFT TEMPER, 0.162-INCH (4.12-MM) DIAMETER.
4. FLAT HANGERS: STEEL SHEET, 1 BY 3/16 INCH (25.4 BY 4.76 MM) BY LENGTH INDICATED.
- F. CARRYING CHANNELS: COLD-ROLLED, COMMERCIAL-STEEL SHEET WITH A BASE-METAL THICKNESS OF 0.0538 INCH (1.37 MM) AND MINIMUM 1/2-INCH- (12.7-MM-) WIDE FLANGES.
- G. GRID SUSPENSION SYSTEM FOR CEILINGS: ASTM C 645, DIRECT-HUNG SYSTEM COMPOSED OF MAIN BEAMS AND CROSS-FURRING MEMBERS THAT INTERLOCK.
- H. STEEL STUDS AND RUNNERS: ASTM C 645. MINIMUM BASE-METAL THICKNESS: 0.0179 INCH (0.45 MM).
- I. SLIP-TYPE HEAD JOINTS: WHERE INDICATED, PROVIDE ONE OF THE FOLLOWING:
1. DOUBLE-RUNNER SYSTEM: ASTM C 645 TOP RUNNERS, INSIDE RUNNER WITH 2-INCH- (50.8-MM-) DEEP FLANGES IN THICKNESS NOT LESS THAN INDICATED FOR STUDS AND FASTENED TO STUDS, AND OUTER RUNNER SIZED TO FRICTION FIT INSIDE RUNNER.
2. DEFLECTION TRACK: STEEL SHEET TOP RUNNER MANUFACTURED TO PREVENT CRACKING OF FINISHES APPLIED TO INTERIOR PARTITION FRAMING RESULTING FROM DEFLECTION OF STRUCTURE ABOVE; IN THICKNESS NOT LESS THAN INDICATED FOR STUDS AND IN WIDTH TO ACCOMMODATE DEPTH OF STUDS.
- J. FLAT STRAP AND BACKING PLATE: STEEL SHEET FOR BLOCKING AND BRACING IN LENGTH AND WIDTH INDICATED. MINIMUM BASE-METAL THICKNESS: 0.0179 INCH (0.45 MM).
- K. COLD-ROLLED CHANNEL BRIDGING: 0.0538-INCH (1.37-MM) BARE-STEEL THICKNESS, WITH MINIMUM 1/2-INCH- (12.7-MM-) WIDE FLANGES.
- L. HAT-SHAPED, RIGID FURRING CHANNELS: ASTM C 645. MINIMUM BASE METAL THICKNESS: 0.0179 INCH (0.45 MM).
- M. COLD-ROLLED FURRING CHANNELS: 0.0538-INCH (1.37-MM) BARE-STEEL THICKNESS, WITH MINIMUM 1/2-INCH- (12.7-MM-) WIDE FLANGES.
- N. FASTENERS FOR METAL FRAMING: OF TYPE, MATERIAL, SIZE, CORROSION RESISTANCE, HOLDING POWER, AND OTHER PROPERTIES REQUIRED TO FASTEN STEEL MEMBERS TO SUBSTRATES.
- O. INSTALLATION STANDARD: ASTM C 754.
1. GYPSUM PLASTER ASSEMBLIES: ALSO COMPLY WITH REQUIREMENTS IN ASTM C 841 THAT APPLY TO FRAMING INSTALLATION.
2. PORTLAND CEMENT PLASTER ASSEMBLIES: ALSO COMPLY WITH REQUIREMENTS IN ASTM C 1063 THAT APPLY TO FRAMING INSTALLATION.
3. GYPSUM BOARD ASSEMBLIES: ALSO COMPLY WITH REQUIREMENTS IN ASTM C 840 THAT APPLY TO FRAMING INSTALLATION.
- P. SUSPEND HANGERS FROM BUILDING STRUCTURE AS FOLLOWS:
1. INSTALL HANGERS PLUMB AND FREE FROM CONTACT WITH INSULATION OR OTHER OBJECTS WITHIN CEILING PLENUM THAT ARE NOT PART OF SUPPORTING STRUCTURAL OR SUSPENSION SYSTEM.
2. SPLAY HANGERS ONLY WHERE REQUIRED TO MISS OBSTRUCTIONS AND OFFSET RESULTING HORIZONTAL FORCES BY BRACING, COUNTERSPLAYING, OR OTHER EQUALLY EFFECTIVE MEANS.
3. WHERE WIDTH OF DUCTS AND OTHER CONSTRUCTION WITHIN CEILING PLENUM PRODUCES HANGER SPACINGS THAT INTERFERE WITH LOCATIONS OF HANGERS REQUIRED TO SUPPORT STANDARD SUSPENSION SYSTEM MEMBERS, INSTALL SUPPLEMENTAL SUSPENSION MEMBERS AND HANGERS IN THE FORM OF TRAPEZES OR EQUIVALENT DEVICES.
4. DO NOT ATTACH HANGERS TO STEEL ROOF DECK.
5. DO NOT ATTACH HANGERS TO PERMANENT METAL FORMS. FURNISH CAST-IN-PLACE HANGER INSERTS THAT EXTEND THROUGH FORMS.
6. DO NOT ATTACH HANGERS TO ROLLED-IN HANGER TABS OF COMPOSITE STEEL FLOOR DECK.
7. DO NOT CONNECT OR SUSPEND STEEL FRAMING FROM DUCTS, PIPES, OR CONDUIT.
- Q. SEISMIC BRACING: SWAY-BRACE SUSPENSION SYSTEMS WITH HANGERS USED FOR SUPPORT.

9.2 GYPSUM WALLBOARD

- A. GENERAL: COMPLYING WITH ASTM C 36/C 36M OR ASTM C 1396/C 1396M, AS APPLICABLE TO TYPE OF GYPSUM BOARD INDICATED AND WHICHEVER IS MORE STRINGENT.

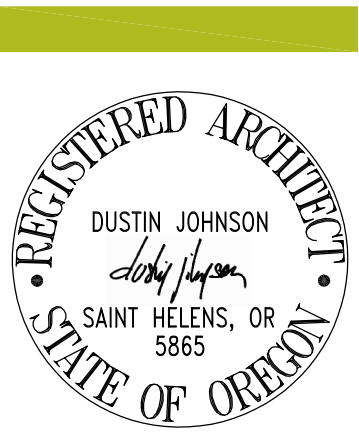
- B. REGULAR TYPE: THICKNESS: 5/8 INCH (15.9 MM), LONG EDGES: TAPERED.
- C. TYPE X: THICKNESS: 5/8 INCH (15.9 MM), LONG EDGES: TAPERED.
- D. MOISTURE- AND MOLD-RESISTANT TYPE: WITH MOISTURE- AND MOLD-RESISTANT CORE AND SURFACES. CORE: 5/8 INCH (15.9 MM), TYPE X. LONG EDGES: TAPERED.
- E. GLASS-MAT GYPSUM SHEATHING BOARD: ASTM C 1177/C 1177M. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE 1/2 INCH (12.7 MM), REGULAR TYPE "DENS-GLASS GOLD" BY G-P GYPSUM.
- F. WATER-RESISTANT GYPSUM BACKING BOARD: ASTM C 630/C 630M OR ASTM C 1396/C 1396M, 5/8 INCH (15.9 MM), TYPE X.
- G. CEMENTITIOUS BACKER UNITS: ANSI A108.1, THICKNESS: AS INDICATED ON DRAWINGS.
- H. INTERIOR TRIM: ASTM C 1047.
- I. EXTERIOR TRIM: ASTM C 1047.
- J. JOINT TREATMENT: COMPLY WITH ASTM C 475/C 475M.
- K. JOINT TAPE:
1. INTERIOR GYPSUM WALLBOARD: PAPER.
- L. JOINT COMPOUND FOR INTERIOR GYPSUM WALLBOARD: FOR EACH COAT USE FORMULATION THAT IS COMPATIBLE WITH OTHER COMPOUNDS APPLIED ON PREVIOUS OR FOR SUCCESSIVE COATS.
- M. JOINT COMPOUND FOR EXTERIOR APPLICATIONS: EXTERIOR GYPSUM SOFFIT BOARD: USE SETTING-TYPE TAPING COMPOUND AND SETTING-TYPE, SANDABLE TOPPING COMPOUND.
- N. JOINT COMPOUND FOR GLASS-MAT GYPSUM SHEATHING BOARD: AS RECOMMENDED BY SHEATHING BOARD MANUFACTURER.
- O. JOINT COMPOUND FOR TILE BACKING PANELS: WATER-RESISTANT GYPSUM BACKING BOARD: USE SETTING-TYPE TAPING COMPOUND AND SETTING-TYPE, SANDABLE TOPPING COMPOUND.
- P. JOINT COMPOUND FOR CEMENTITIOUS BACKER UNITS: AS RECOMMENDED BY BACKER UNIT MANUFACTURER.
- Q. STEEL DRILL SCREWS: ASTM C 1002, UNLESS OTHERWISE INDICATED.
- R. APPLYING AND FINISHING PANELS, GENERAL:
1. COMPLY WITH ASTM C 840.
2. WATER-RESISTANT GYPSUM BACKING BOARD: INSTALL AT SHOWERS, TUBS, AND WHERE INDICATED. INSTALL WITH 1/4-INCH (6.4-MM) GAP WHERE PANELS ABUT OTHER CONSTRUCTION OR PENETRATIONS.
3. CEMENTITIOUS BACKER UNITS: ANSI A108.1, AT LOCATIONS INDICATED TO RECEIVE TILE.
- S. CONTROL JOINTS: INSTALL CONTROL JOINTS AT LOCATIONS INDICATED ON DRAWINGS.
- T. GYPSUM BOARD FINISH LEVELS: FINISH PANELS TO LEVELS INDICATED BELOW:
1. LEVEL 3: THREE COATS OF DRYWALL MUD FINISH- MECHANICAL, ELECTRICAL ROOMS, CUSTODIAL CLOSETS, AND STORAGE ROOMS; EXCEEDS SURFACE LEVEL #3.
2. LEVEL 4: FOUR COATS DRYWALL MUD FINISH- CLASSROOMS; EXCEEDS SURFACE LEVEL #4.
3. LEVEL 4: FIVE COATS DRYWALL MUD FINISH- CORRIDORS, GYMNASIUMS, LOCKER ROOMS, CAFETERIA, OFFICES, HIGH TRAFFIC/PUBLIC AREAS; EXCEEDS SURFACE LEVEL #4.
4. CEMENTITIOUS BACKER UNITS: FINISH ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

9.3 TILING

- A. PROVIDE SAMPLES FOR EACH TYPE AND COMPOSITION OF TILE AND FOR EACH COLOR AND FINISH REQUIRED.
- B. ANSI CERAMIC TILE STANDARD: PROVIDE UNGLAZED CERAMIC TILE FLOORING THAT COMPLIES WITH ANSI A137.1 FOR TYPES, COMPOSITIONS, AND OTHER CHARACTERISTICS INDICATED.
- C. REFER TO BSD FOR TILE MANUFACTURER, PATTERN, COLOR, AND SIZES.
- D. PORTLAND CEMENT MORTAR (THICKSET) INSTALLATION MATERIALS: ANSI A108.02.
- E. LATEX-PORTLAND CEMENT MORTAR (THIN SET): ANSI A118.4.
- F. ORGANIC ADHESIVE: ANSI A136.1, TYPE I, WITH A VOC CONTENT OF 65 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).
- G. POLYMER-MODIFIED TILE GROUT: ANSI A118.7.
- H. TROWELABLE UNDERLAYMENTS AND PATCHING COMPOUNDS: LATEX-MODIFIED, PORTLAND CEMENT-BASED FORMULATION PROVIDED OR APPROVED BY MANUFACTURER OF TILE-SETTING MATERIALS FOR INSTALLATIONS INDICATED.
- I. GROUT SEALER: MANUFACTURER'S STANDARD SILICONE PRODUCT FOR SEALING GROUT JOINTS AND THAT DOES NOT CHANGE COLOR OR APPEARANCE OF GROUT.
- J. COMPLY WITH TCA'S "HANDBOOK FOR CERAMIC TILE INSTALLATION" FOR TCA INSTALLATION METHODS SPECIFIED IN TILE INSTALLATION SCHEDULES. COMPLY WITH PARTS OF THE ANSI A108 SERIES "SPECIFICATIONS FOR INSTALLATION OF CERAMIC TILE" THAT ARE REFERENCED IN TCA INSTALLATION METHODS, SPECIFIED IN TILE INSTALLATION SCHEDULES, AND APPLY TO TYPES OF SETTING AND GROUTING MATERIALS USED.

9.4 PAINTING

- A. MATERIAL COMPATIBILITY:
1. PROVIDE MATERIALS FOR USE WITHIN EACH PAINT SYSTEM THAT ARE COMPATIBLE WITH ONE ANOTHER AND SUBSTRATES INDICATED, UNDER CONDITIONS OF SERVICE AND APPLICATION AS DEMONSTRATED BY MANUFACTURER, BASED ON TESTING AND FIELD EXPERIENCE.
2. FOR EACH COAT IN A PAINT SYSTEM, PROVIDE PRODUCTS RECOMMENDED IN WRITING BY MANUFACTURERS OF TOPCOAT FOR USE IN PAINT SYSTEM AND ON SUBSTRATE INDICATED.
- B. COLORS: REFER TO BSD FOR COLOR
- C. SHEEN: SEMI-GLOSS.
- D. SUBMITTALS:
1. SUBMIT PRODUCT MSDS AND PRODUCT DATA SHEETS.
2. SUBMIT DRAW DOWNINGS TO ARCHITECT FOR COLOR VERIFICATION.
- F. COMPLY WITH ALL LOCAL AND STATE ORDINANCES REGARDING VOC CONTENT OF PRODUCTS FOR INDOOR OR OUTDOOR APPLICATIONS.
- G. MAXIMUM MOISTURE CONTENT OF SUBSTRATES: WHEN MEASURED WITH AN ELECTRONIC MOISTURE METER AS FOLLOWS:
1. CONCRETE: 12 PERCENT.
2. MASONRY (CLAY AND CMU): 12 PERCENT.
3. WOOD: 15 PERCENT.
4. PLASTER: 12 PERCENT.
5. GYPSUM BOARD: 12 PERCENT.
- I. VERIFY SUITABILITY OF SUBSTRATES, INCLUDING SURFACE CONDITIONS AND COMPATIBILITY WITH EXISTING FINISHES AND PRIMERS.
- J. COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND RECOMMENDATIONS IN "MPI ARCHITECTURAL PAINTING SPECIFICATION MANUAL" APPLICABLE TO SUBSTRATES AND PAINT SYSTEMS INDICATED.
- K. GYPSUM BOARD SUBSTRATES: LATEX SYSTEM:
1. PRIME COAT: INTERIOR/EXTERIOR PVA (POLYVINYL ACETATE) MATCHING TOPCOAT.
15. INTERMEDIATE COAT: INTERIOR/EXTERIOR ACRYLIC LATEX, RODDA PAINT PASYN, OR EQUAL TOPCOAT.
16. TOPCOAT: INTERIOR/EXTERIOR ACRYLIC.



18/03/20 DATE  
1 03/23/2020 PRELIMINARY DRAWING SET  
2 03/31/2020 REVIEW/DRAWING SET  
3 04/21/2020 PERMIT DRAWING SET



TENANT IMPROVEMENT FOR:  
**BSD OAK HILLS ELEMENTARY- TR REMODEL**  
2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

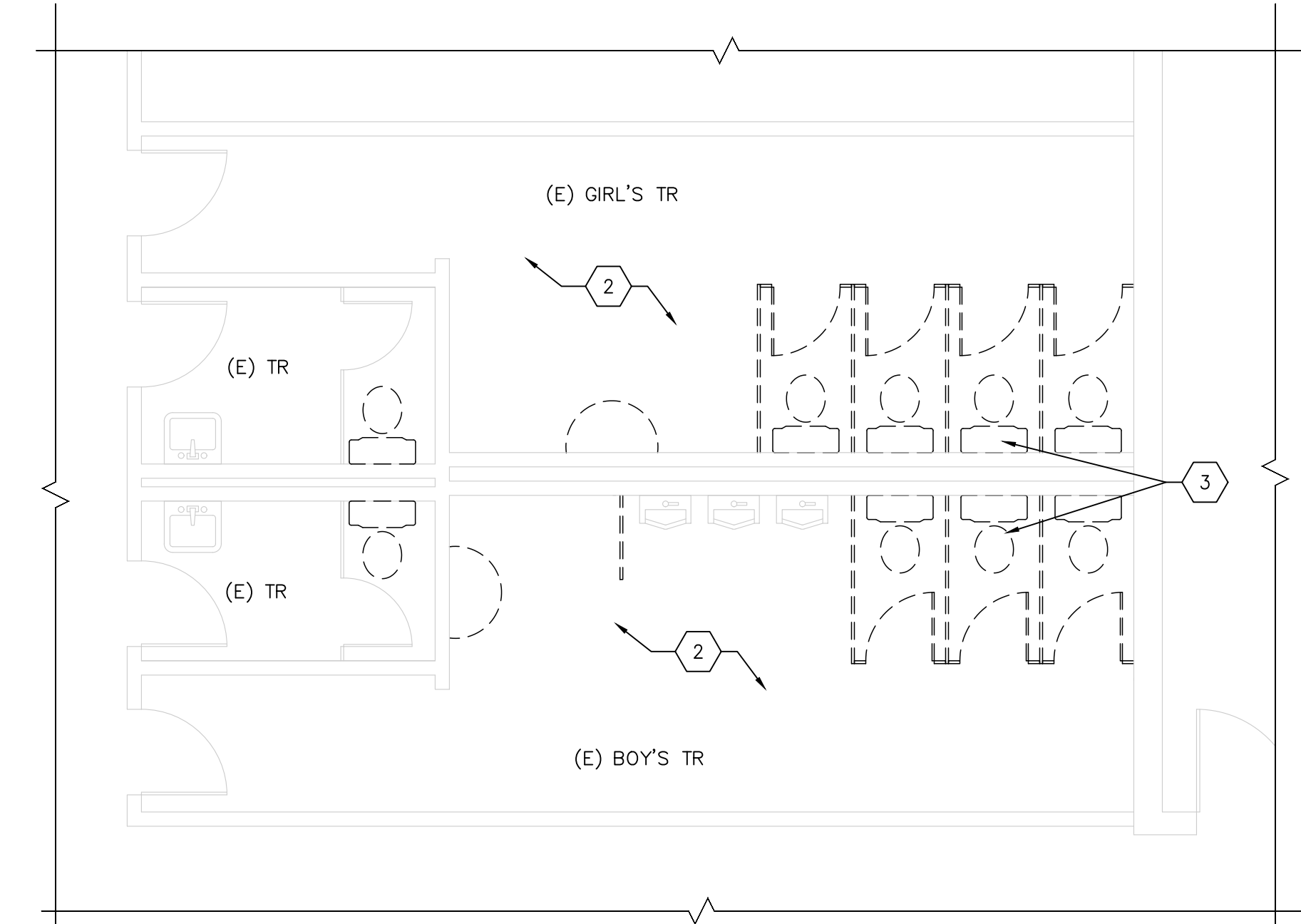
GENERAL NOTES

**GN1**

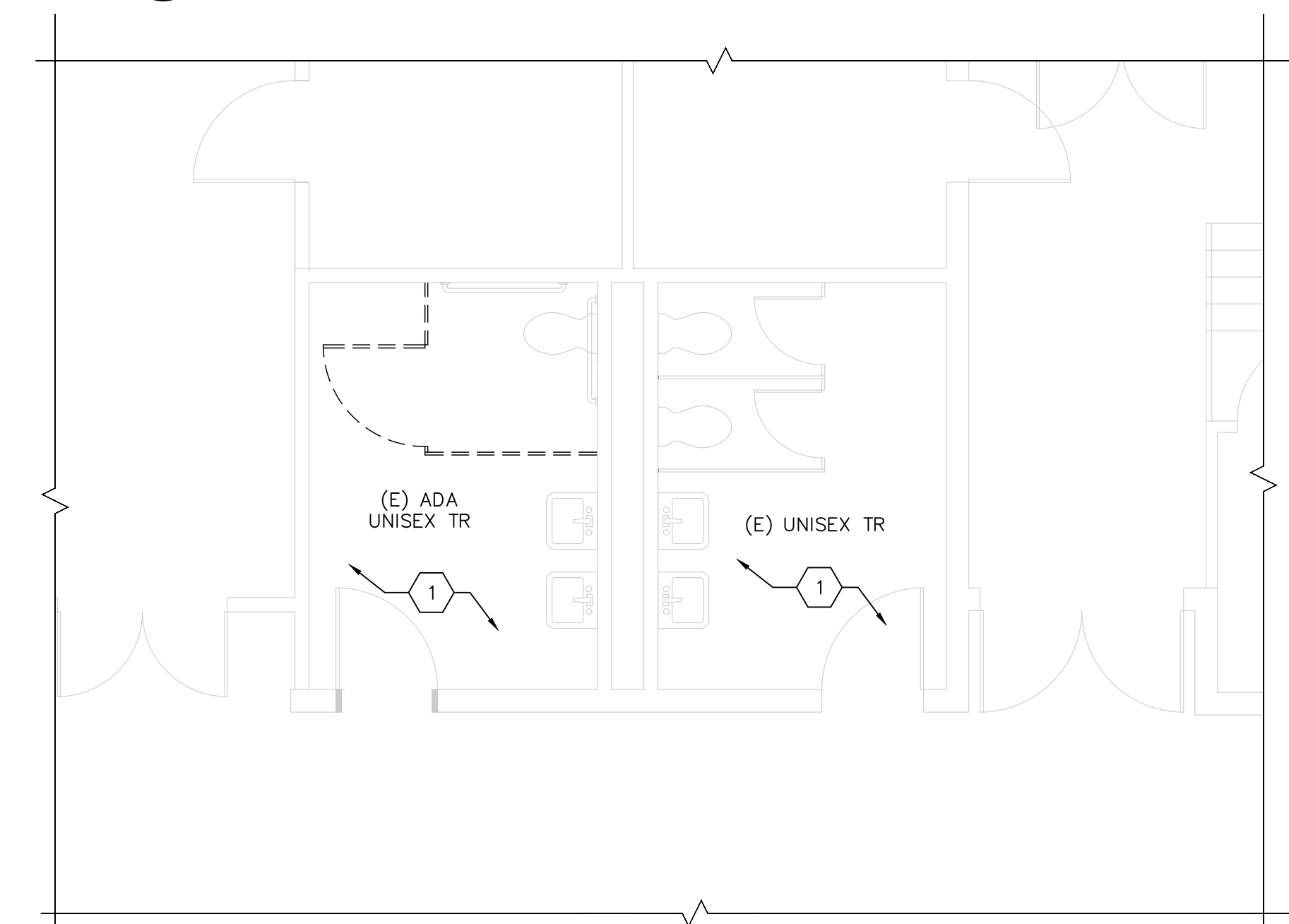
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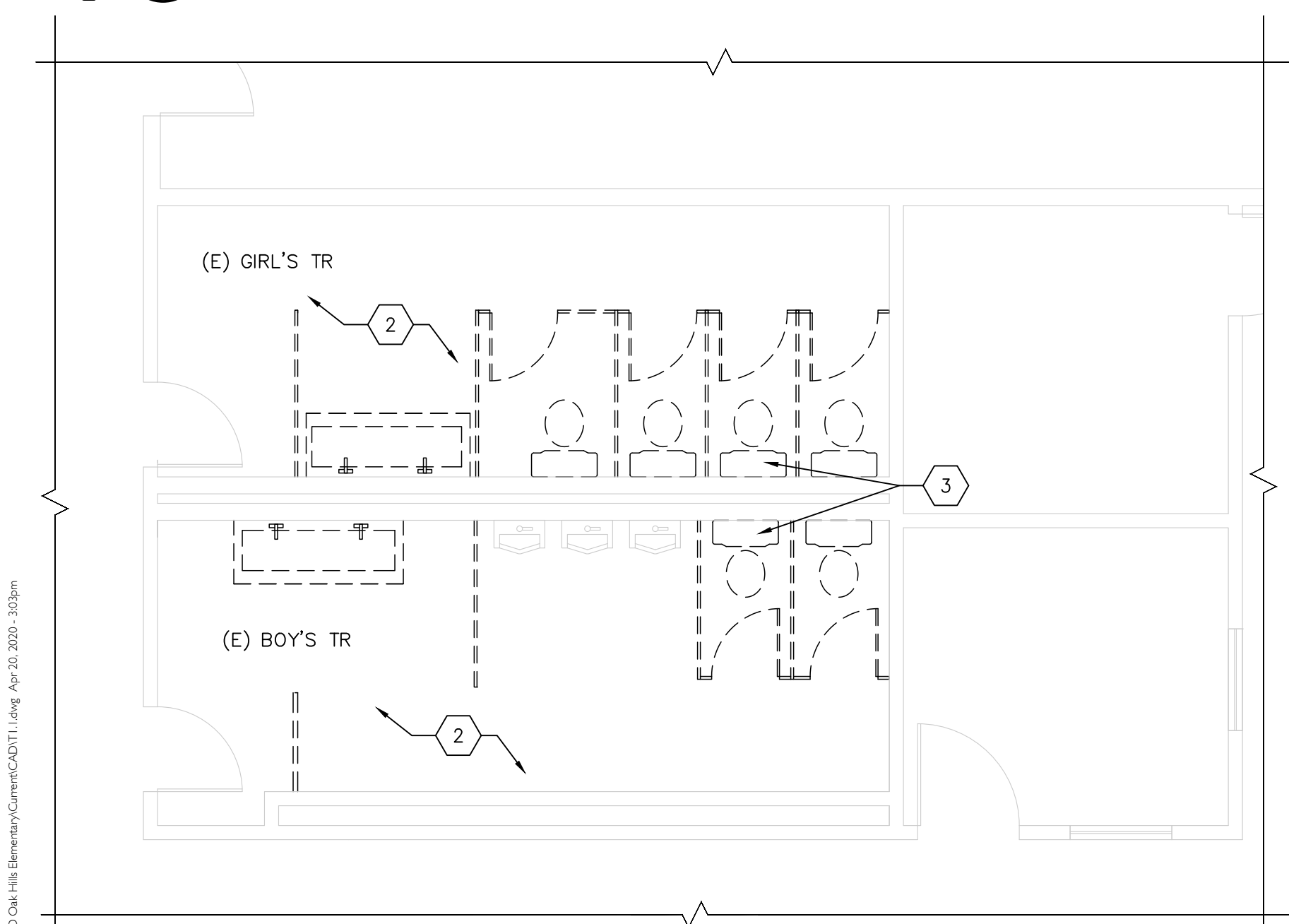




**1 DEMO FLOOR PLAN - A126 & A127**  
1/4" = 1'-0"



**3 DEMO FLOOR PLAN - A130 & A132**  
1/4" = 1'-0"



**5 DEMO FLOOR PLAN - B110 & B112**  
1/4" = 1'-0"

### DEMO FLOOR PLAN LEGEND

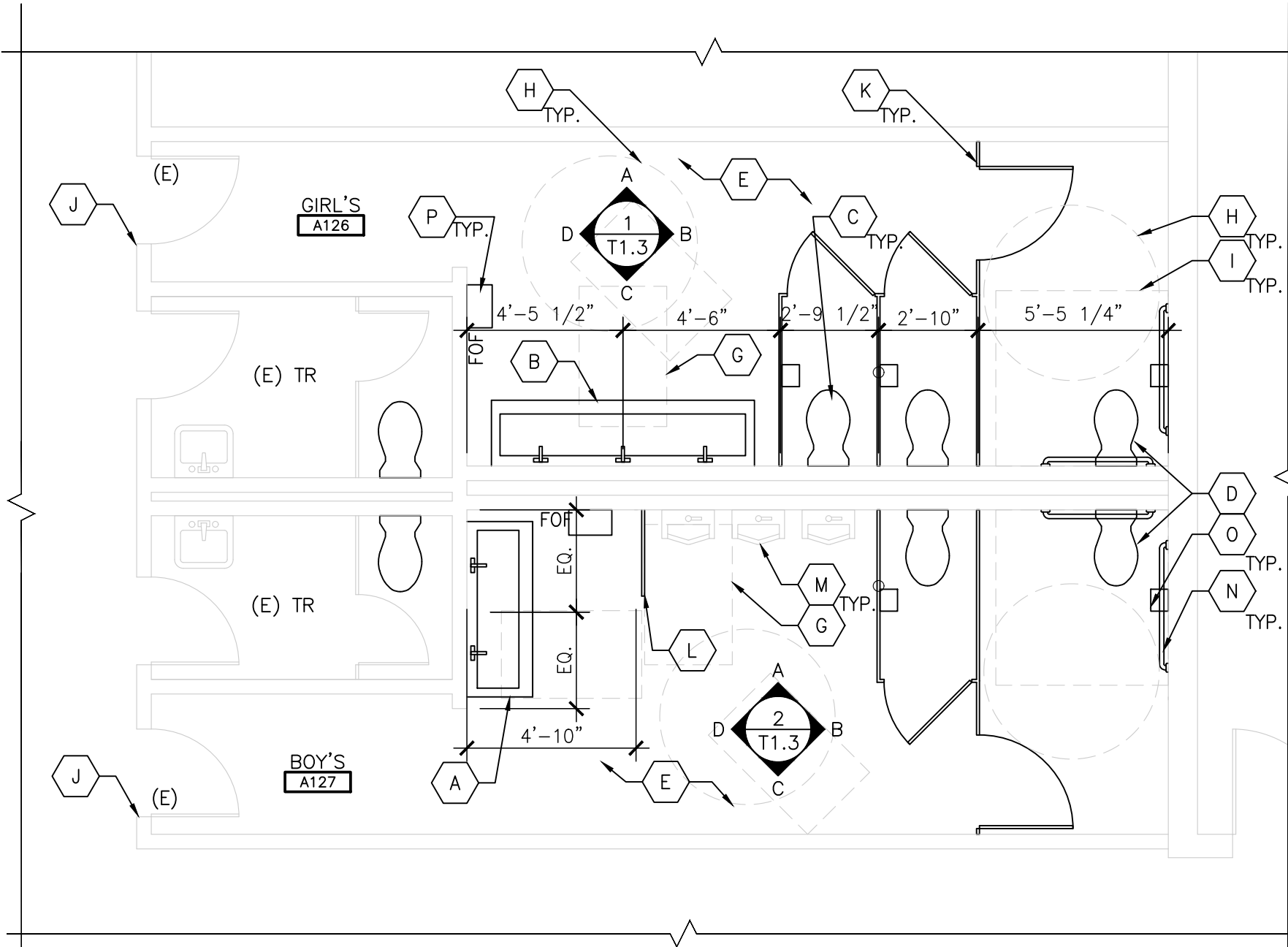
- (E) WALL TO REMAIN
- (E) PARTITION TO BE DEMOLISHED
- FOF (E) FACE OF FINISH EXISTING
- (E) WATER CLOSET TO BE REMOVED, CAP PLUMBING
- (E) LAVATORY TO BE REMOVED, CAP PLUMBING
- (E) BRADLEY LAVATORY TO BE REMOVED
- (E) TOILET PARTITION TO BE REMOVED

### DEMO FLOOR PLAN GENERAL NOTES

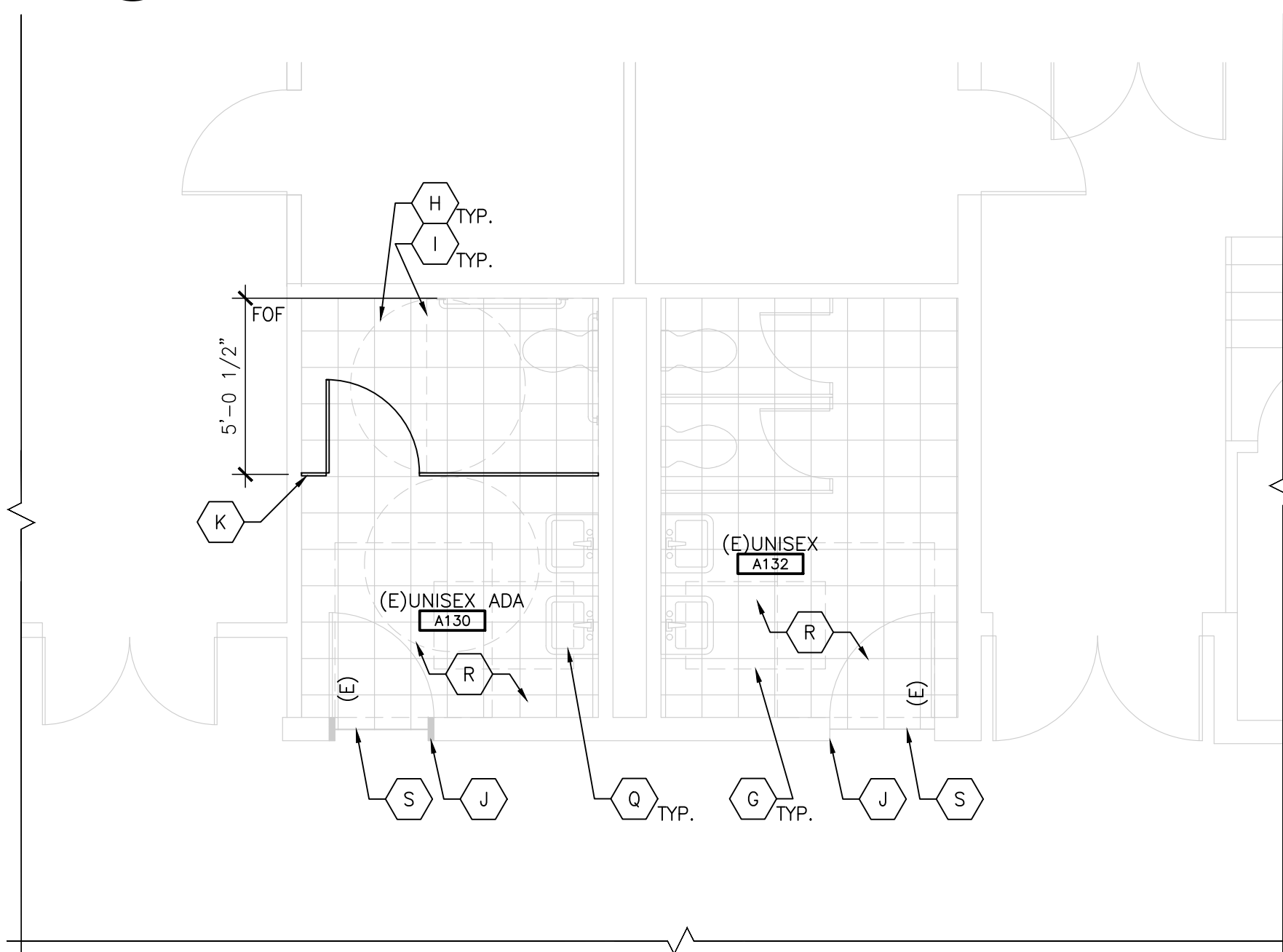
- CONTRACTOR TO VERIFY EXISTING CONDITIONS SHOWN OR IMPLIED PRIOR TO DEMOLITION & NOTIFY A/E OF ANY DISCREPANCIES.
- COORDINATE PLUMBING FIXTURES SALVAGE REQUIREMENTS WITH BSD.

### DEMO FLOOR PLAN KEYNOTES

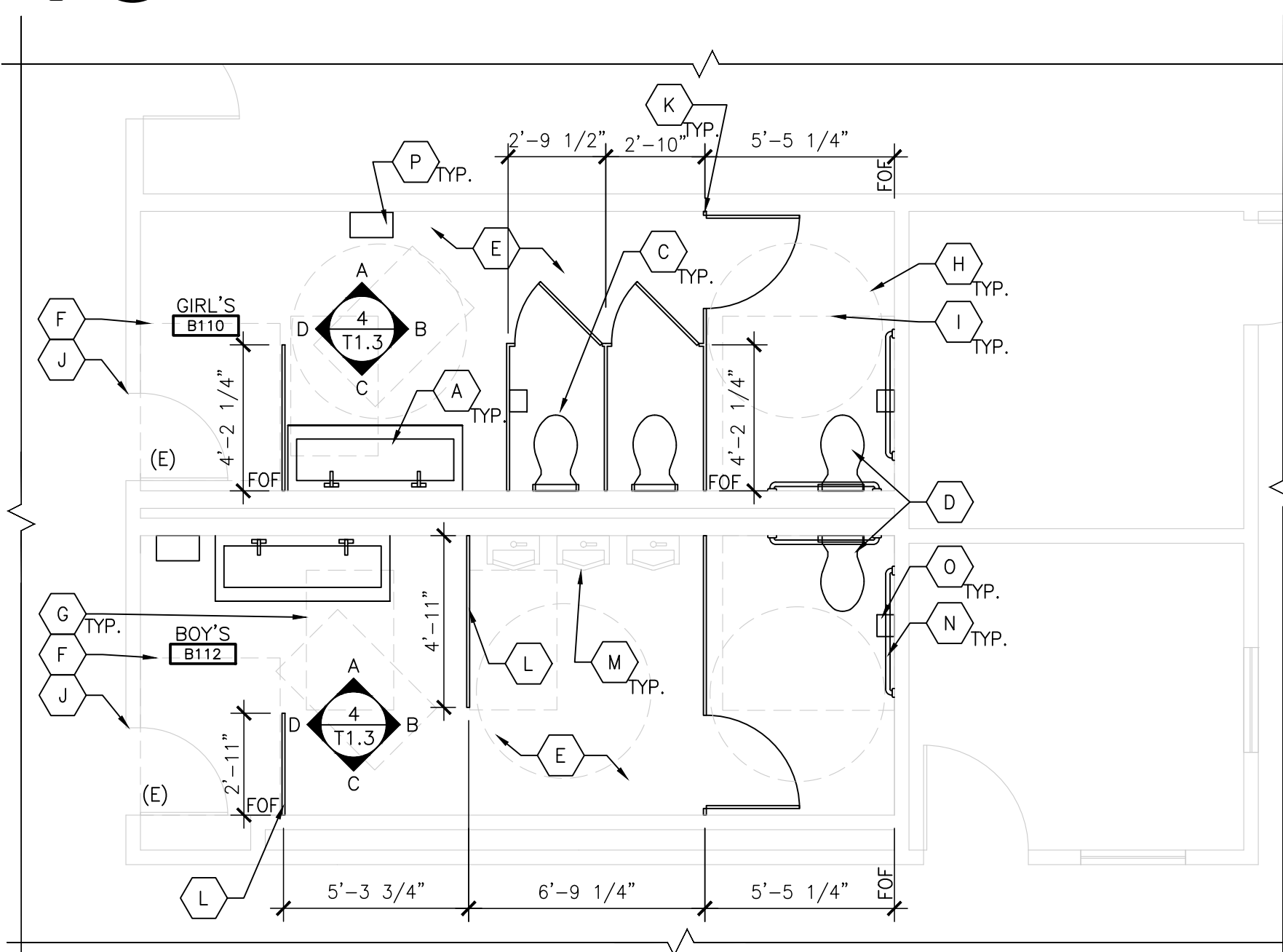
- DEMO ALL EXISTING FLOORING/ CLOSETS, REINSTALL (E) FIXTURES AFTER TILE INSTALL.
- (E) FLOOR, WALL AND CEILING FINISHES TO REMAIN-PATCH AND REPAIR TO "LIKE NEW" CONDITION
- DEMO EXISTING FIXTURE, CAP PLUMBING, PATCH AND REPAIR WALL/FLOORING TO "LIKE NEW" CONDITION. SEE 2/T1.1 & 6/T1.1 FOR NEW PLUMBING AND LAYOUT



**2 ENLARGED FLOOR PLAN - A126 & A127**  
1/4" = 1'-0"



**4 ENLARGED FLOOR PLAN - A130 & A132**  
1/4" = 1'-0"



**6 ENLARGED FLOOR PLAN - B110 & B112**  
1/4" = 1'-0"

### FLOOR PLAN LEGEND

- CORRIDOR (E) WALL (N) TOILET PARTITION
- ROOM NAME & NUMBER (E) FOF (E) FLOOR DRAIN
- T-1 TILE FLOORING/6" TILE BASE, TBD GRID INSTALLATION

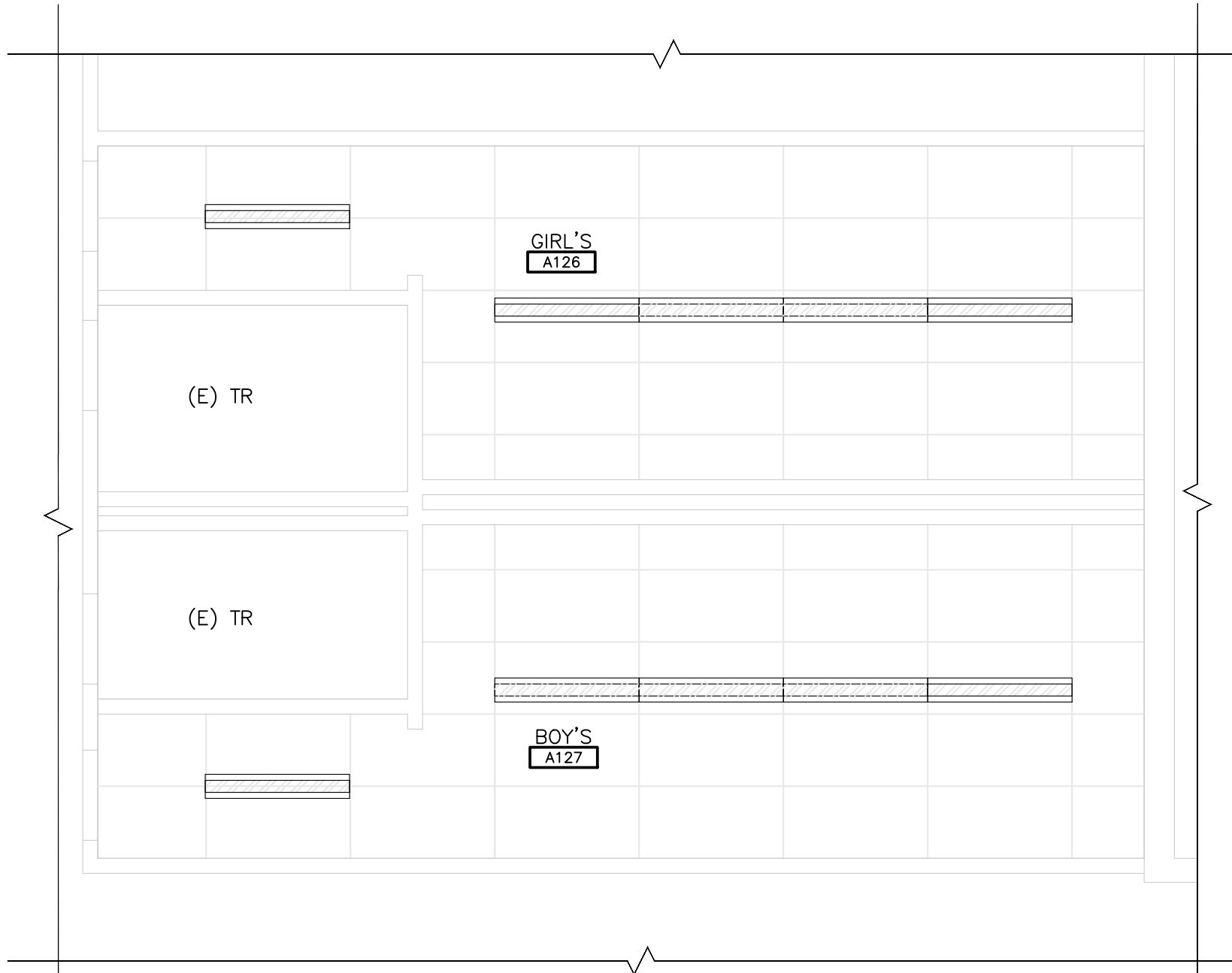
### FLOOR PLAN GENERAL NOTES

- ALL CONDITIONS SHOWN OR IMPLIED ON THE DRAWINGS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. NOTIFY A/E IMMEDIATELY OF ANY DISCREPANCIES.
- ALL DIMENSIONS ARE TO CENTERLINE OF NEW TOILET PARTITION U.N.O.
- ALL FINISHES TO BE SELECTED/COORDINATED DIRECTLY BY BEAVERTON SCHOOL DISTRICT AND STANDARDS.
- ALL WATER CLOSETS TO BE STANDARD HEIGHT U.N.O.
- VERIFY ALL FINISH SELECTIONS WITH TENANT AND OWNER PRIOR TO ORDER/INSTALL.
- HATCHES SHOWN FOR REPRESENTATIONAL PURPOSES ONLY. CONTACT ARCHITECT/DESIGNER FOR INSTALLATION DIRECTIONS AND METHODS.

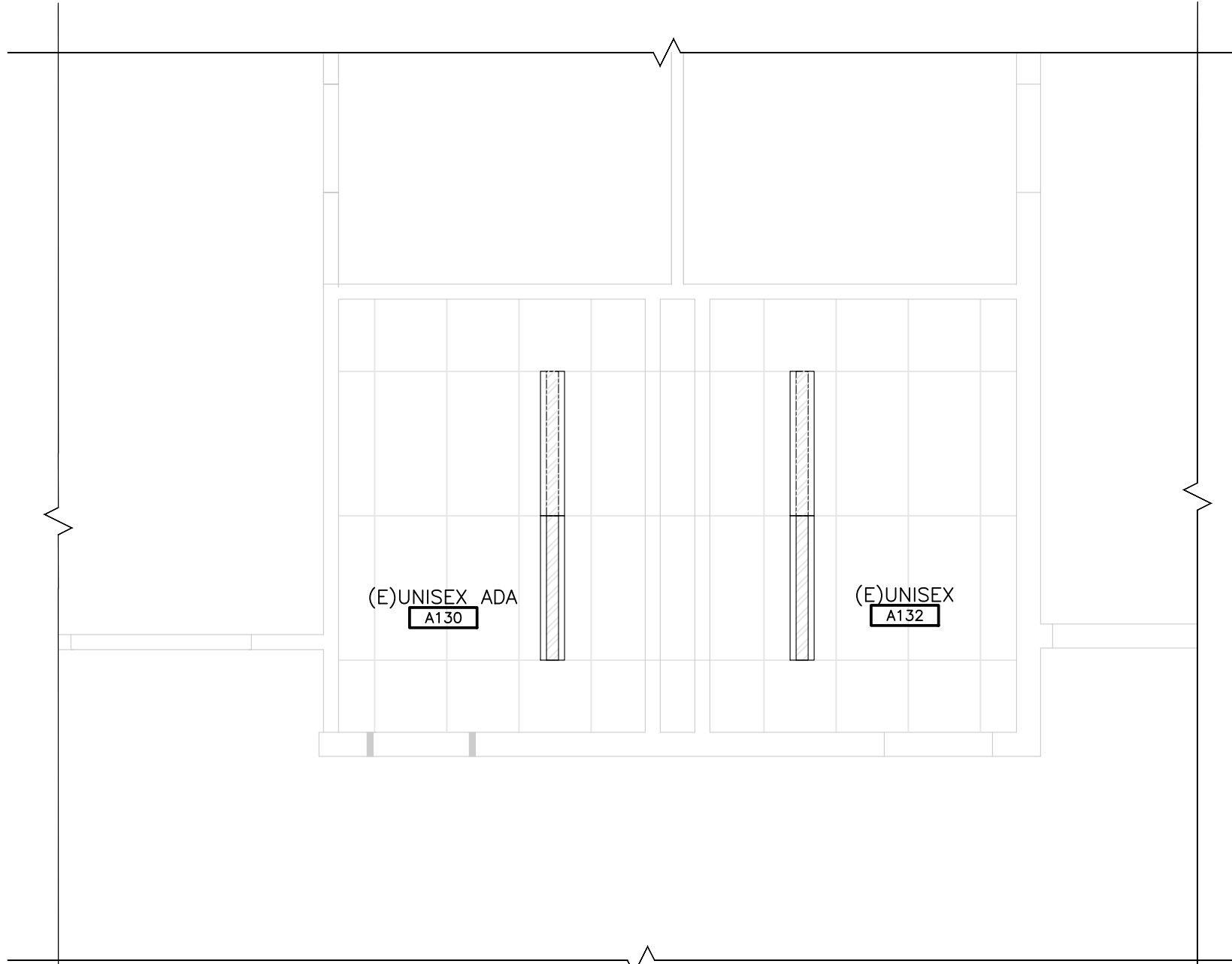
### FLOOR PLAN KEYNOTES SEE 6/T1.3 FOR MOUNTING HEIGHTS

- (N) WALL MOUNTED ACCESSIBLE LAVATORY, BRADLEY CORP 22.5"x60", 2 FAUCETS, SOAP DISPENSERS
- (N) WALL MOUNTED ACCESSIBLE LAVATORY, BRADLEY CORP 22.5"x90", 3 FAUCETS, TWO SOAP DISPENSERS
- (N) TANKLESS FLOOR MOUNTED WATER CLOSET
- (N) TANKLESS FLOOR MOUNTED ADA ACCESSIBLE WATER CLOSET
- (E) FINISHES TO REMAIN- PATCH AND REPAIR TO "LIKE NEW" CONDITION
- ADA DOOR CLEARANCE
- 30"x48" ADA CLEAR FLOOR SPACE
- 60" DIA. ADA TURNING RADIUS
- 59"x60" FIXTURE CLEARANCE
- (E) DOOR --- CONTRACTOR TO CONFIRM 32" MIN. CLEAR OPENING WHEN DOOR IS IN FULLY-OPEN POSITION
- (N) FLOOR-MOUNTED TOILET PARTITION
- (N) FLOOR-MOUNTED PRIVACY PARTITION
- (E) ADA URINAL
- (N) GRAB BARS
- (N) TOILET TISSUE DISPENSER--- WALL MOUNTED
- (N) WALL MOUNTED PAPER TOWEL DISPENSER
- (E) ADA WALL MOUNTED LAVATORY- VERIFY ADA HEIGHT
- (N) TILE FLOORING
- PROVIDE ADA COMPLIANT STAINLESS STEEL METAL TRANSITION STRIP (SCHLUTER OR EQUAL) BETWEEN FLOORING MATERIALS

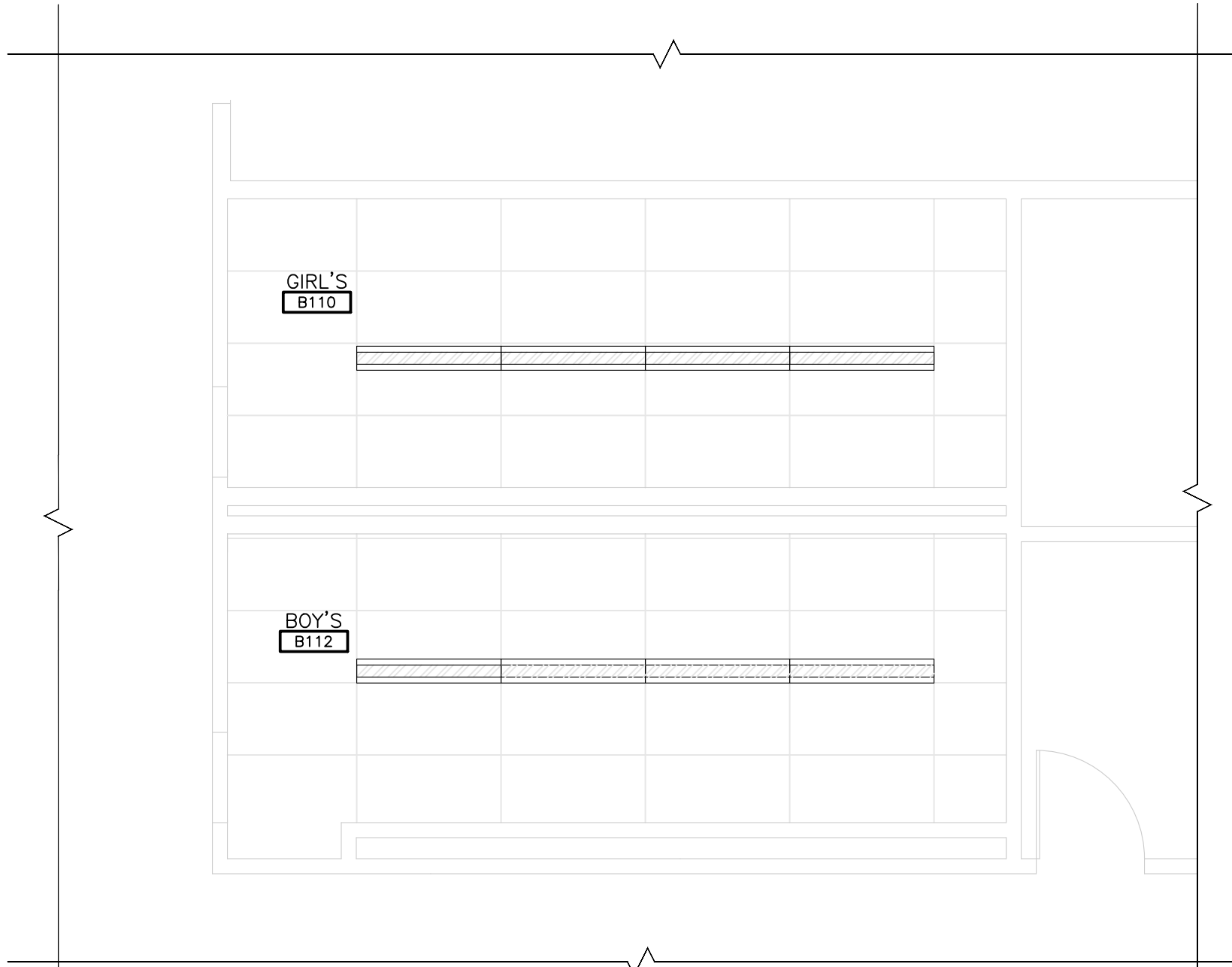
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**1 REFLECTED CEILING PLAN - A126 & A127**  
1/4" = 1'-0"



**2 REFLECTED CEILING PLAN - A130 & A132**  
1/4" = 1'-0"



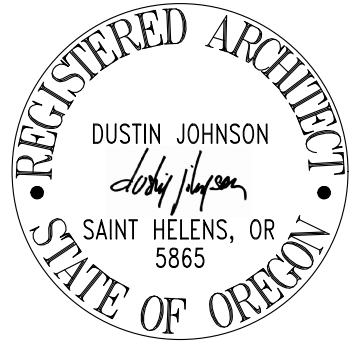
**3 REFLECTED CEILING PLAN - B110 & B112**  
1/4" = 1'-0"

## RCP GENERAL NOTES

1. THIS DRAWING IS DIAGRAMMATIC AND FOR DESIGN PURPOSES ONLY.
2. JUNCTION BOXES TO BE PAINTED TO MATCH ADJACENT SURFACE.
3. VERIFY ALL BUILDING CONDITIONS - REPORT ANY CONFLICTS OR ADVERSE CONDITIONS TO ARCHITECT.
6. CEILING GRID AND ACOUSTICAL TILES TO REMAIN. WHERE DEMO HAS OCCURRED WITH REMOVAL OF PRIVACY PARTITIONS PATCH AND REPAIR TILES TO "LIKE NEW" CONDITION
7. ELECTRICAL CONTRACTOR TO VERIFY MINIMUM EMERGENCY EXIT ILLUMINATION WITH BATTERY BACK-UP AT EGRESS PATH OF TRAVEL. PROVIDE 1 F.C. MIN. EMERGENCY LIGHTING AT PATH OF TRAVEL. THIS LEVEL MAY NOT DIMINISH TO LESS THAN .06 F.C. OVER 1.5 HOURS OF OPERATION
8. CONTRACTOR TO VERIFY ALL LIGHTING STANDARDS ARE MET - COORDINATE WITH LIGHTING CONTRACTOR

## RCP LEGEND

- CORRIDOR  
T100
- ROOM NAME & NUMBER
- (E) SUSPENDED ACOUSTICAL CEILING-- TO REMAIN
- (E) 1X4 SURFACE MOUNTED LIGHT FIXTURE-- TO REMAIN



ISSUED DATE  
1 03/23/2020 PRELIMINARY DRAWING SET  
2 03/31/2020 REVIEW/DRAWING SET  
3 04/21/2020 PERMIT DRAWING SET



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PORTLAND, OREGON 97224  
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FAX: 503.226.1670  
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TENANT IMPROVEMENT FOR:

**BSD OAK HILLS ELEMENTARY- TR REMODEL**

2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

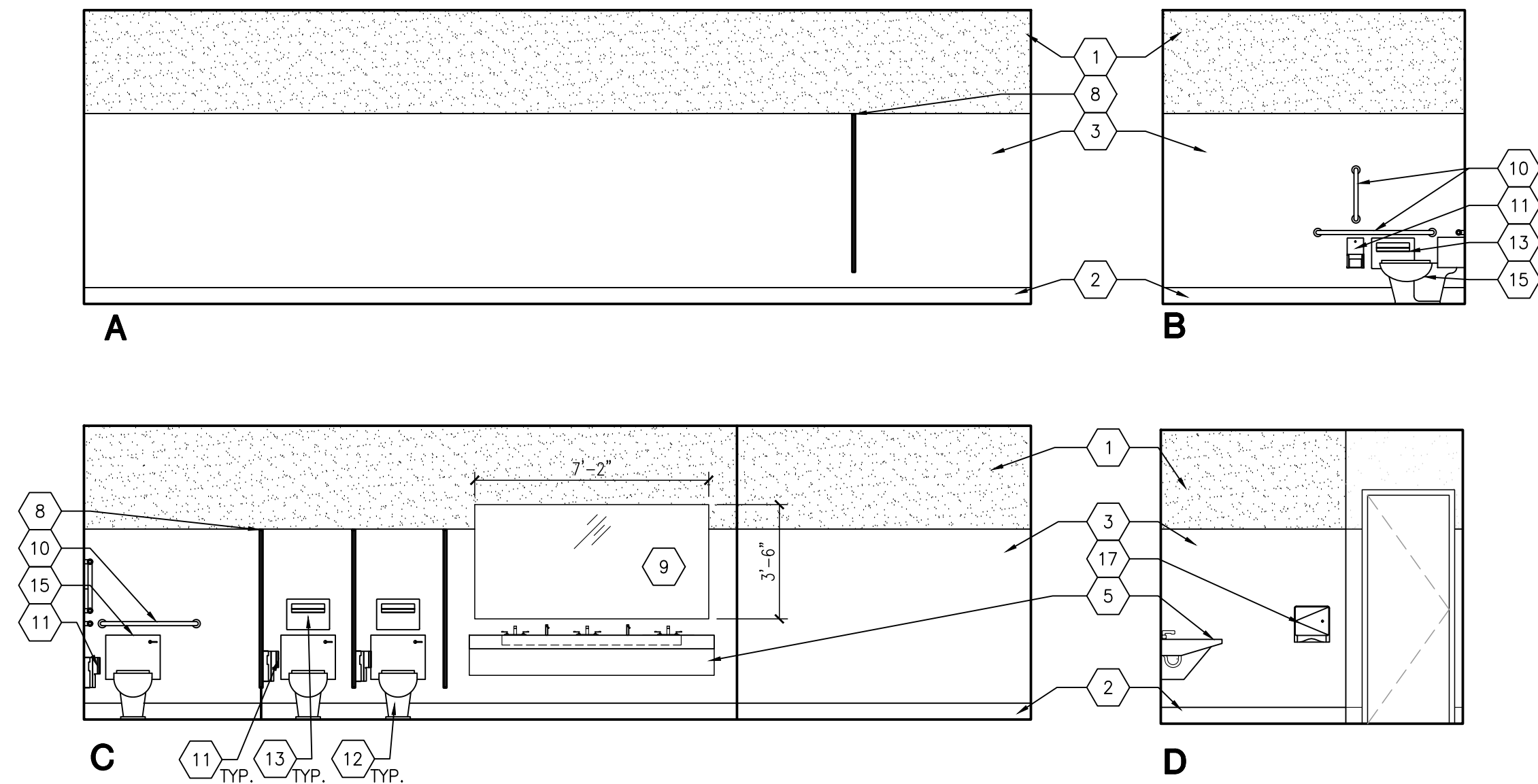
RCP

**T1.2**

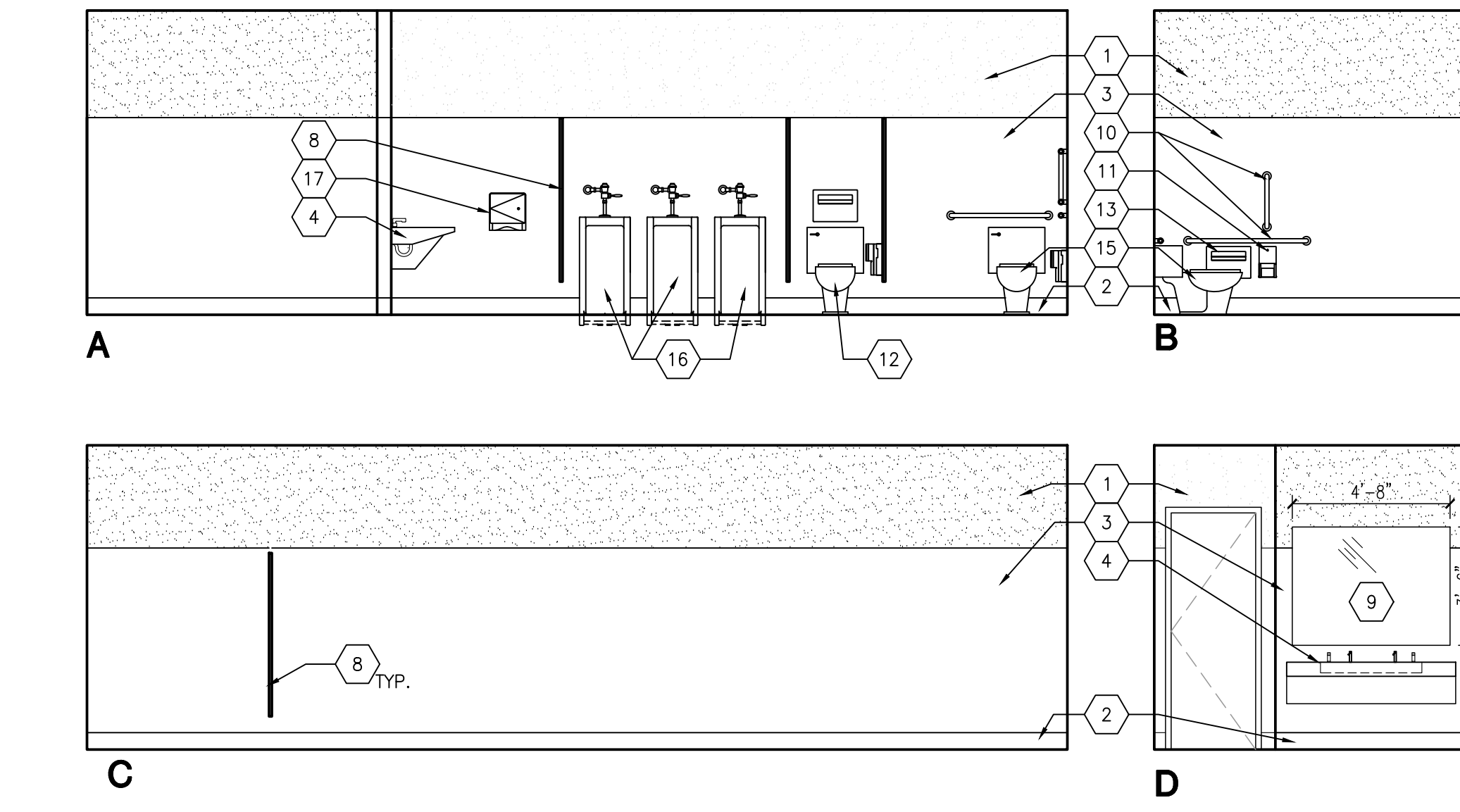
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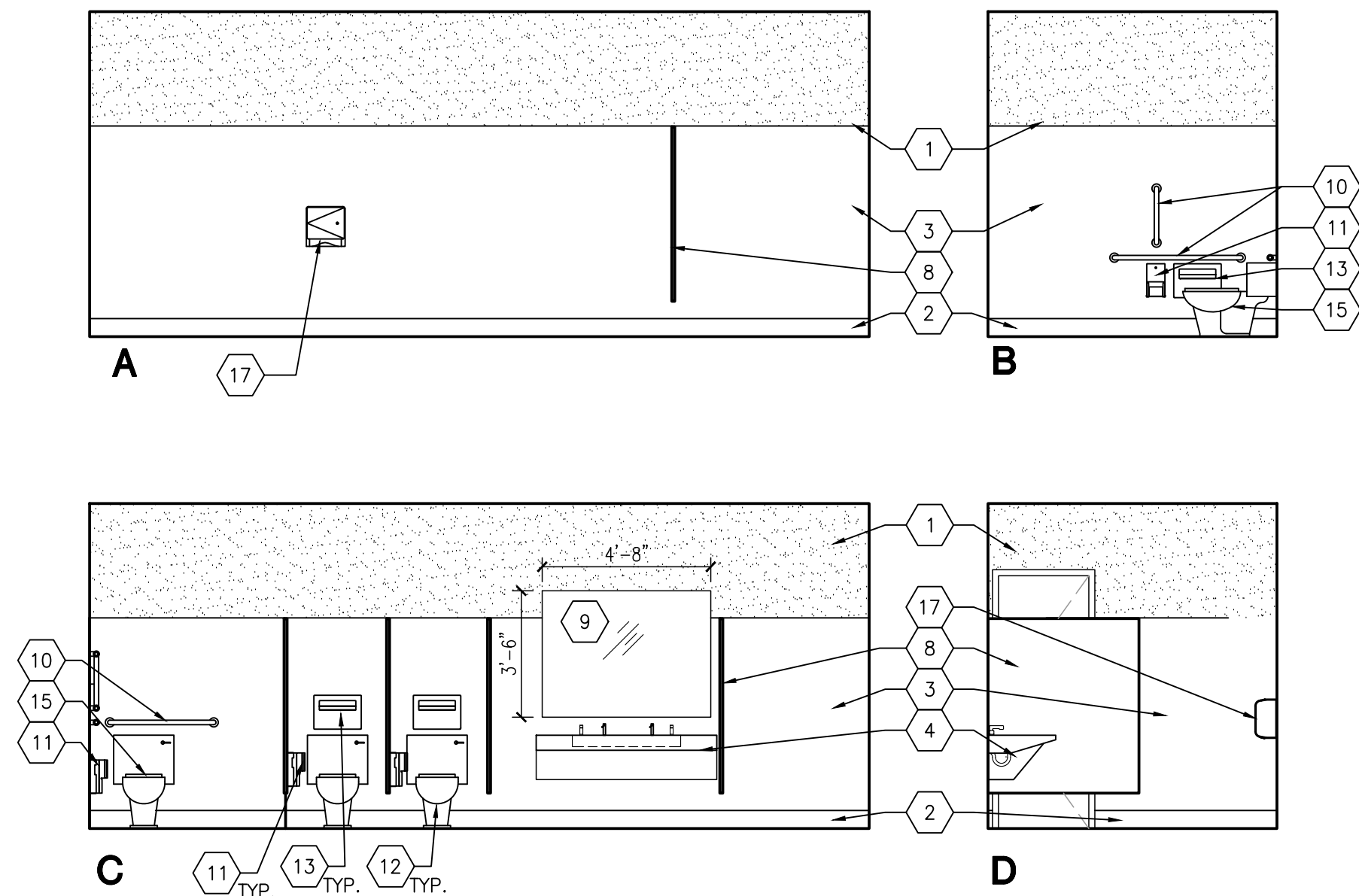




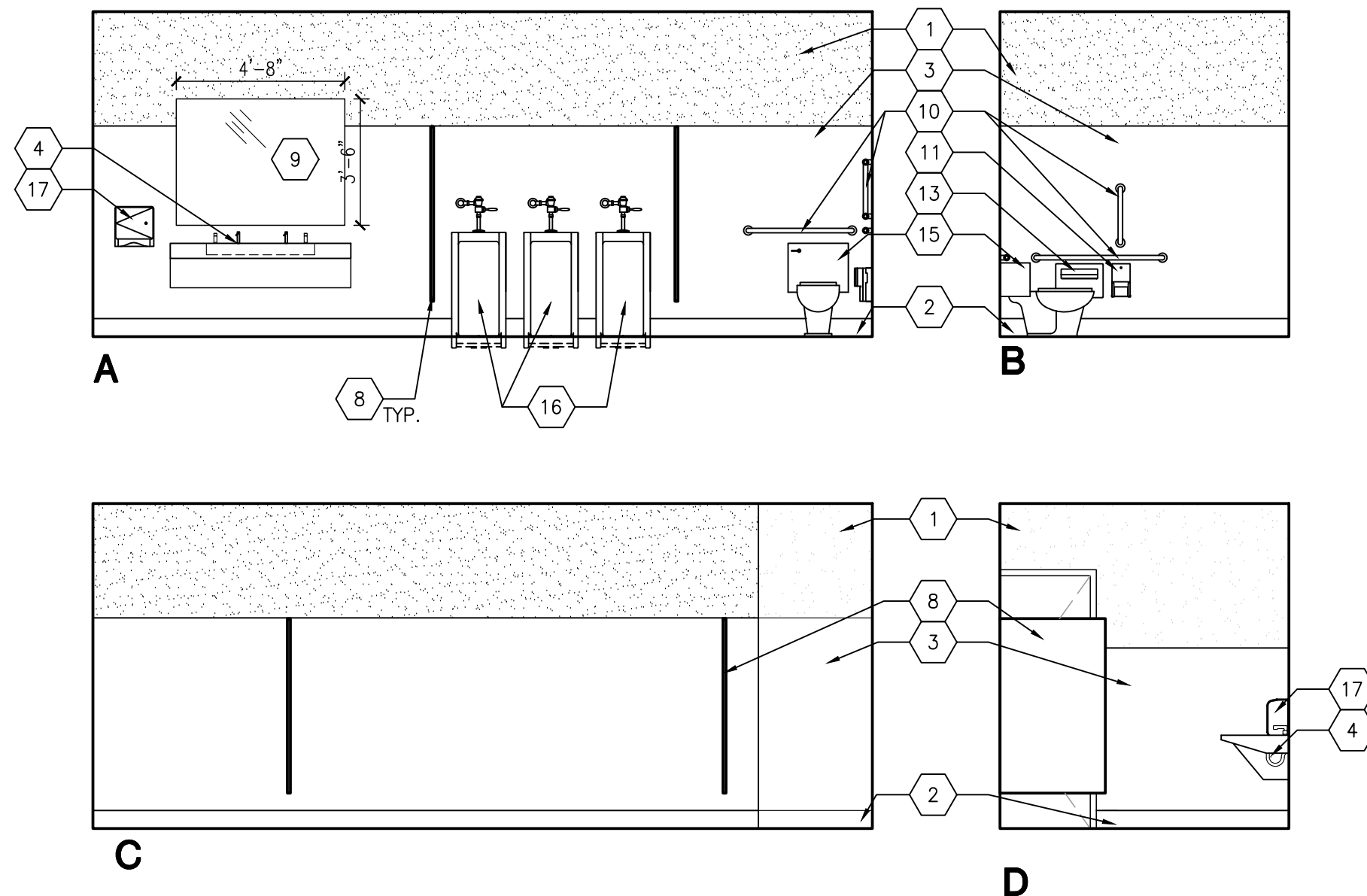
**1 GIRL'S T.R. A126 ELEVATIONS**  
1/4" = 1'-0"



**2 BOY'S T.R. A127 ELEVATIONS**  
1/4" = 1'-0"



**3 GIRL'S T.R. B110 ELEVATIONS**  
1/4" = 1'-0"



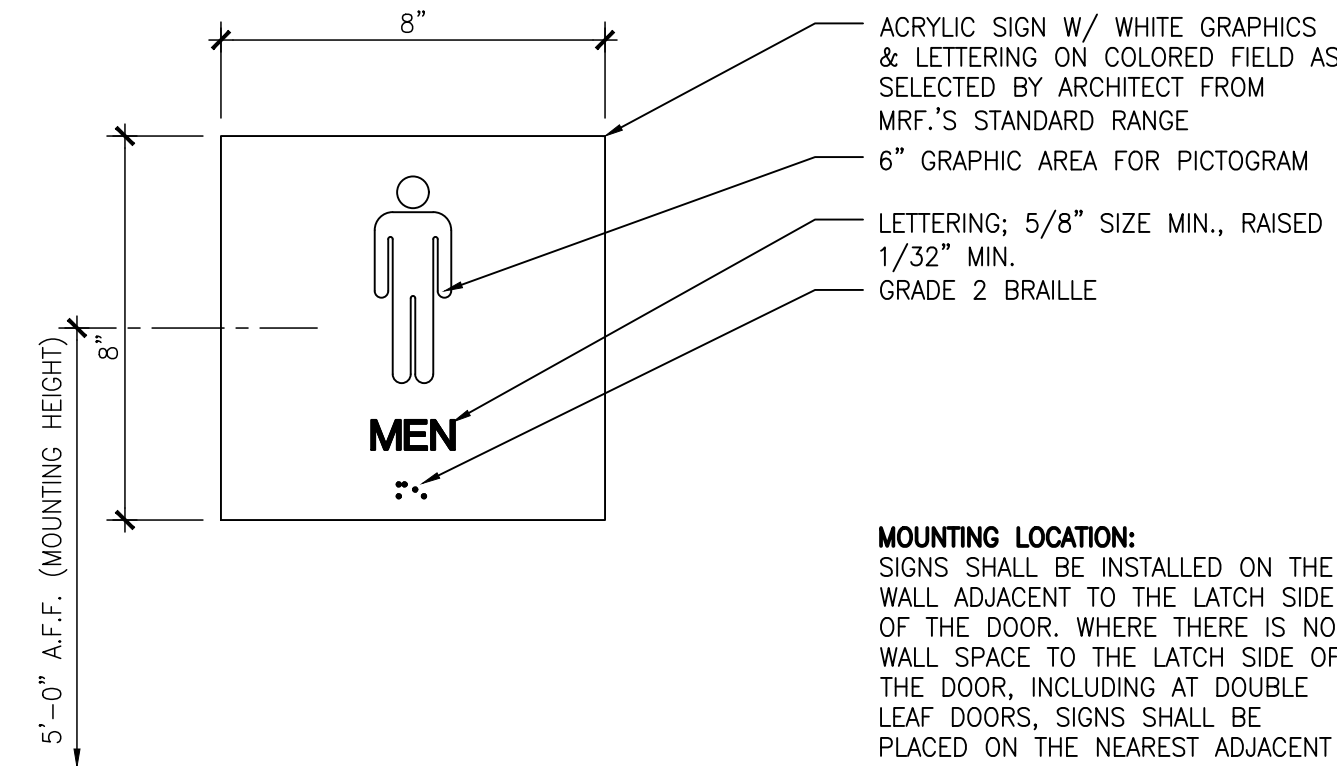
**4 BOY'S T.R. B112 ELEVATIONS**  
1/4" = 1'-0"

## ELEVATION GENERAL NOTES

- ALL ACCESSIBLE TOILET STALLS AND ACCESSORIES SHALL COMPLY WITH IBC SECTION 1109 AND ANSI A117.1-2003 CHAPTER 6.
- SEE PLAN FOR FIXTURE PLACEMENT. PARTITIONS AS INDICATED ON PLAN.
- PROVIDE WALL STOPS, IVES WS407CCV, AT ALL ADA STALLS BEHIND PARTITION BUMPER.
- ALL DIMENSIONS FOR FIXTURES AND ACCESSORIES ARE FROM FACE OF FINISH TO CENTER LINE, UNO.

## ELEVATION KEYNOTES - SEE 5/T1.3 FOR MOUNTING HEIGHT

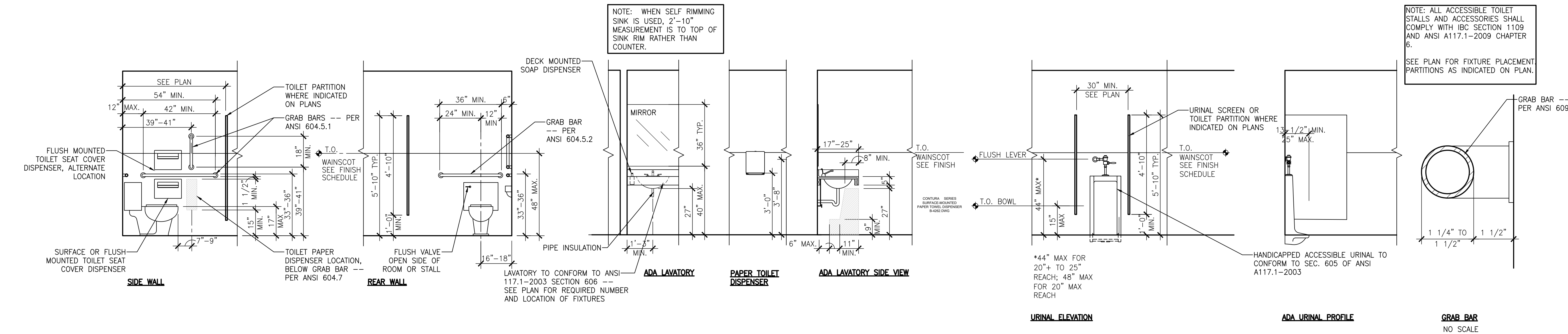
- PAINTED GYP. BOARD
- (E) BASE
- (E) WAINSCOT 60" A.F.F.
- (N) BRADLEY 60" LAVATORY
- (N) BRADLEY 90" LAVATORY
- (N) WALL MOUNTED LAVATORY
- NOT USED
- (N) FLOOR MOUNTED TOILET PARTITION- PER PLAN
- MIRROR
- ADA GRAB BARS
- TOILET TISSUE DISPENSER
- 17" MAX WATER CLOSET
- TOILET SEAT COVER DISPENSER
- NOT USED
- ADA ACCESSIBLE WATER CLOSET
- (E) ADA ACCESSIBLE URINAL - FLOOR MOUNTED
- WALL MOUNTED PAPER TOWEL DISPENSER



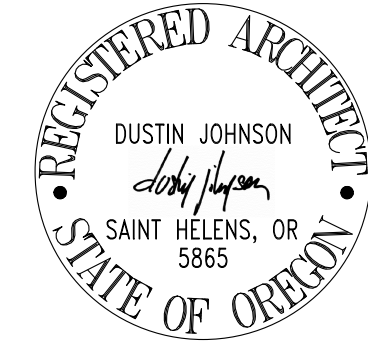
ACRYLIC SIGN W/ WHITE GRAPHICS & LETTERING ON COLORED FIELD AS SELECTED BY ARCHITECT FROM MRF.'S STANDARD RANGE  
6" GRAPHIC AREA FOR PICTOGRAM  
LETTERING; 5/8" SIZE MIN., RAISED 1/32" MIN.  
GRADE 2 BRAILLE

**5 TOILET ROOM IDENTIFICATION**  
3" = 1'-0"

101400-01



**6 FIXTURE MOUNTING HEIGHTS**  
3/8" = 1'-0"



03/23/2020 PRELIMINARY DRAWING SET  
03/31/2020 REVIEW/DRAWING SET  
04/2/2020 PERMIT DRAWING SET



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**BSD OAK HILLS ELEMENTARY- TR REMODEL**

TENANT IMPROVEMENT FOR:

2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

TOILET ROOM  
ELEVATIONS & DETAILS

**T1.3**

JOB NO. 20Y007.01

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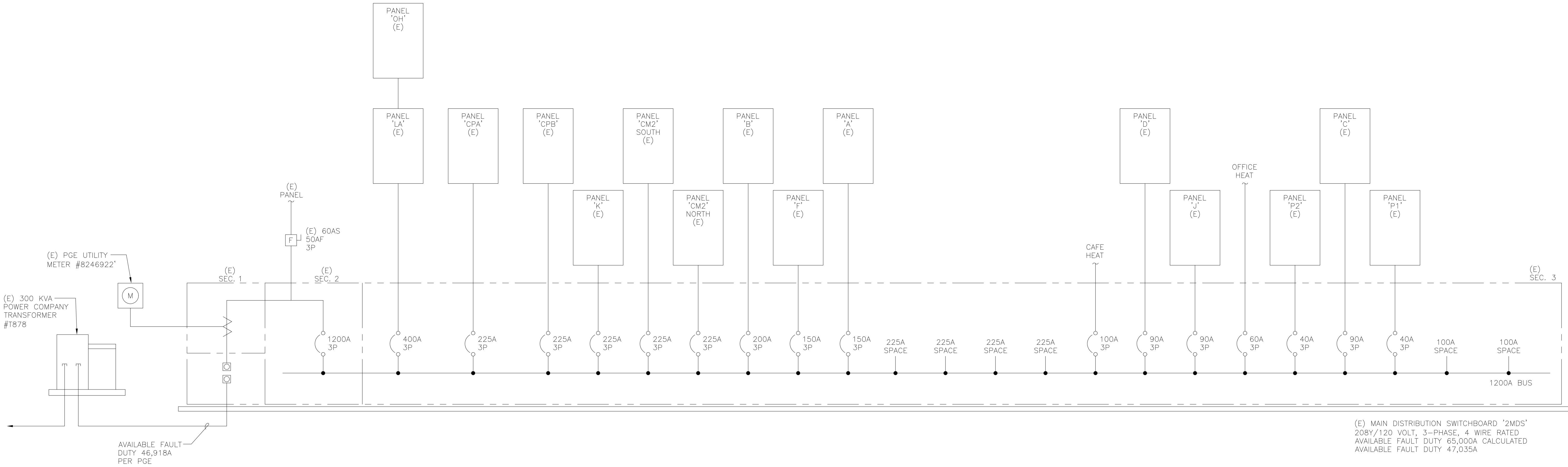


HVAC/PLUMBING EQUIPMENT CONNECTION SCHEDULE							
TAG	DESCRIPTION	LOAD	VOLT/PH	CIRCUIT	DISCONNECT	FEEDER	NOTES
EF-2	EXHAUST FAN	38W	115/1	C-6.	INTEGRAL	201	1
NOTES: 1. NEW EQUIPMENT IS BEING RECONNECTED TO EXISTING CIRCUIT. 2. SEE MO.1 FOR CONTROLS.							

REVISED LOADS			
CIRCUIT	EQUIPMENT	REMOVED (W)	ADDED (W)
C-6.	EF-2	187.00	38.00
TOTAL (W)		187.00	38.00

FEEDER SCHEDULE	
TYPE	DESCRIPTION
201	(1) #12 CU THWN, (1) #12 CU GND IN 0.75"C.
NOTE: FEEDER SCHEDULE APPLIES TO ALL ELECTRICAL DRAWINGS AND SCHEDULES.	

ELECTRICAL SYMBOL LIST			
AFF	ABOVE FINISHED GRADE		HOME RUN. HASH MARKS INDICATE (2) #12 WIRE UNLESS NOTED OTHERWISE
C	CONDUIT		CONDUCTORS IN CONDUIT, (2) #12 OR AS NOTED (QUANTITY AS INDICATED BY HASH MARKS)
(E)	EXISTING TO REMAIN		GROUND WIRE
F	FLEX CONDUIT		GROUND CONNECTION
G	GROUND WIRE		EQUIPMENT CONNECTION
GND	GROUND		LIGHT FIXTURE - RECESSED
IG	ISOLATED GROUND		LIGHT FIXTURE - ON EMERGENCY CIRCUIT
MVOLT	MULTI VOLTAGE		SWITCH DESIGNATOR
(N)	NEW		SWITCH - SINGLE-POLE, MOUNT 48" AFF, UON
(R)	RELOCATE		SWITCH - SINGLE-POLE, THERMO OVER-LOAD
UON	UNLESS OTHERWISE NOTED		RECEPTACLE - DUPLEX, ABOVE COUNTER, GFI
W	WIRE		RECEPTACLE - DUPLEX, ISOLATE GROUND
---	CONDUIT - BELOW GRADE		MOTOR CONNECTION
---	CONDUIT - CONCEALED		
---	CONDUIT - EXPOSED		
---	CONDUIT - STUB-OUT		
---	CONDUIT - STUB-UP		



1 EXISTING MAIN BUILDING ONE-LINE DIAGRAM  
E0.1 NOT TO SCALE

#### DRAWING INDEX

E0.1	SYMBOL, ABBREVIATIONS & EXISTING ONE-LINE DIAGRAMS
E1.1	FLOOR PLANS - ELECTRICAL DEMO
E1.2	FLOOR PLANS - ELECTRICAL SPECIFICATION
E2.0	

ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET

**R&W**  
ENGINEERING, INC.  
"Engineering Integrated Solutions"  
9015 S.W. Allen Blvd., Suite 107  
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Phone: (503) 726-3314  
Fax: (503) 726-3326  
E-mail: rrweng@rweng.com  
Project No.: 382.118.001  
Contact: HIEDI SPEER

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TENANT IMPROVEMENT FOR:

**BSD OAK HILLS ELEMENTARY- TR REMODEL**

2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

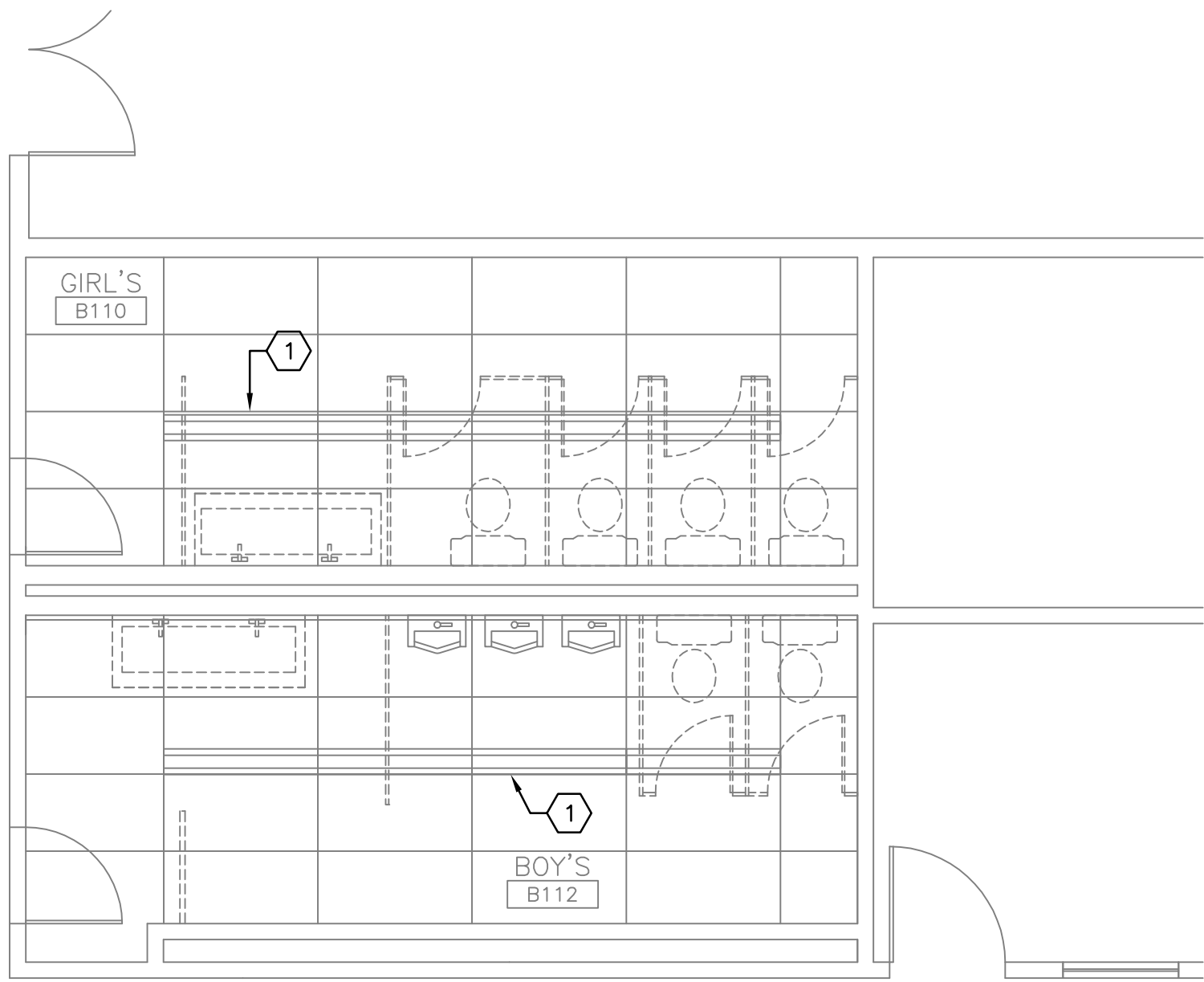
SYMBOL AND ABBREVIATIONS

**E0.1**

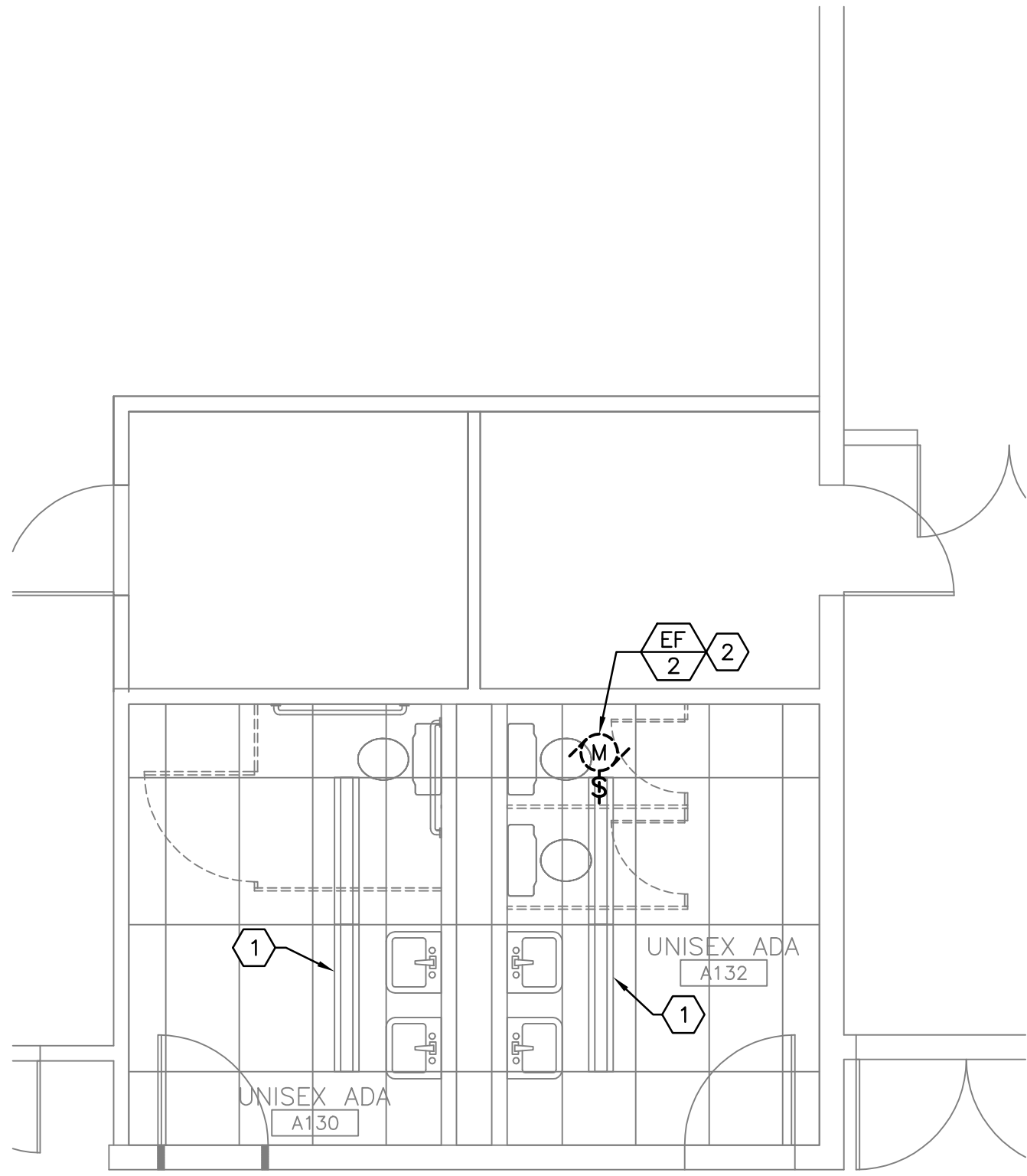
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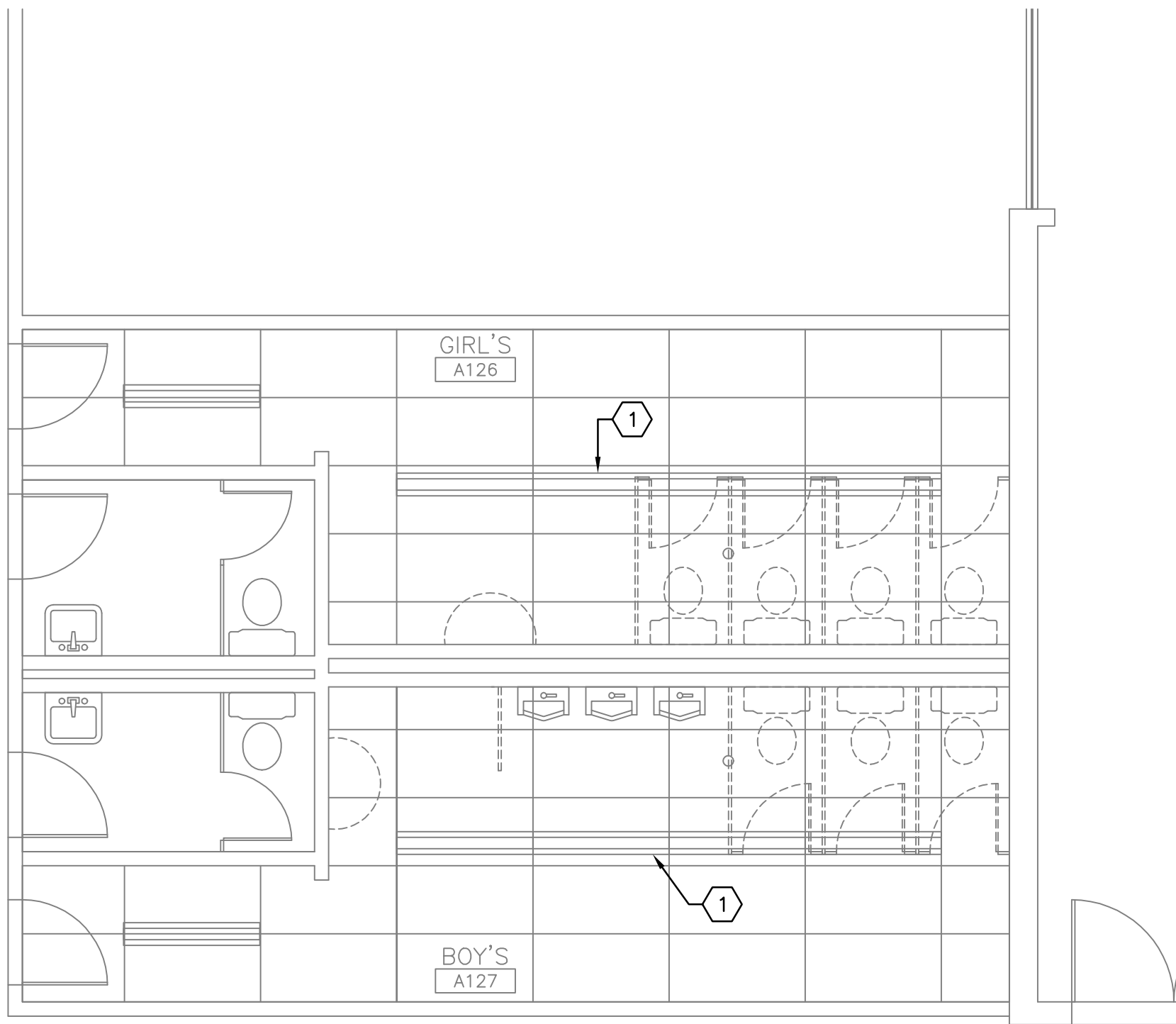
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1 DEMO FLOOR PLAN, B110 & B112 - ELECTRICAL  
E1.1 SCALE: 1/4" = 1'-0"



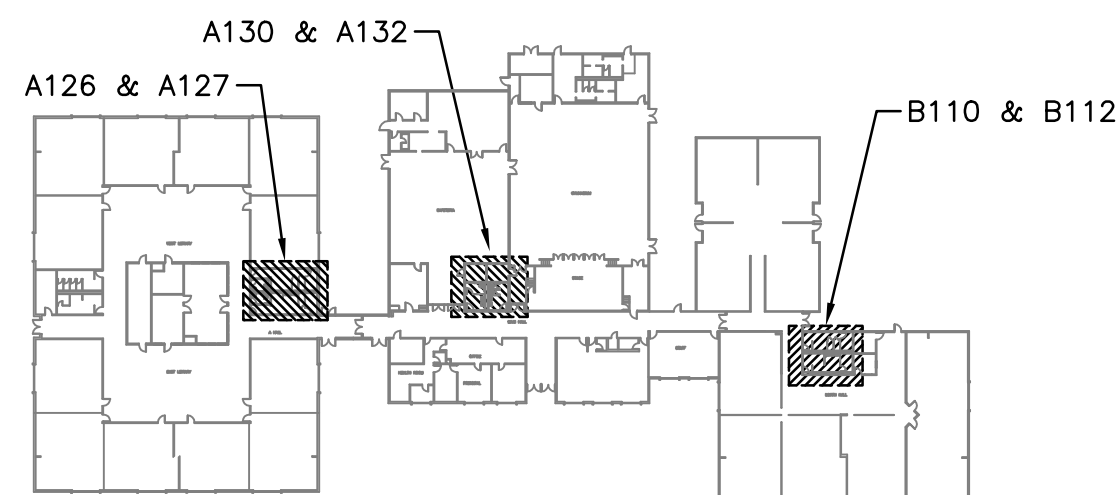
2 DEMO FLOOR PLAN, A130 & A132 - ELECTRICAL  
E1.1 SCALE: 1/4" = 1'-0"



3 DEMO FLOOR PLAN, A126 & 127 - ELECTRICAL  
E1.1 SCALE: 1/4" = 1'-0"

## NOTES THIS SHEET

- 1 EXISTING SURFACE MOUNTED LUMAIRES TO REMAIN. PROTECT FROM DAMAGE DURING CONSTRUCTION.
- 2 EXISTING EXHAUST FAN TO BE REMOVED. EXISTING CONDUCTORS TO BE REUSED, WHERE POSSIBLE, FOR NEW EXHAUST FAN.



KEY PLAN



ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET

**R&W**  
ENGINEERING, INC.  
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9015 S.W. Allen Blvd., Suite 107  
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TENANT IMPROVEMENT FOR:  
**BSD OAK HILLS ELEMENTARY- TR REMODEL**  
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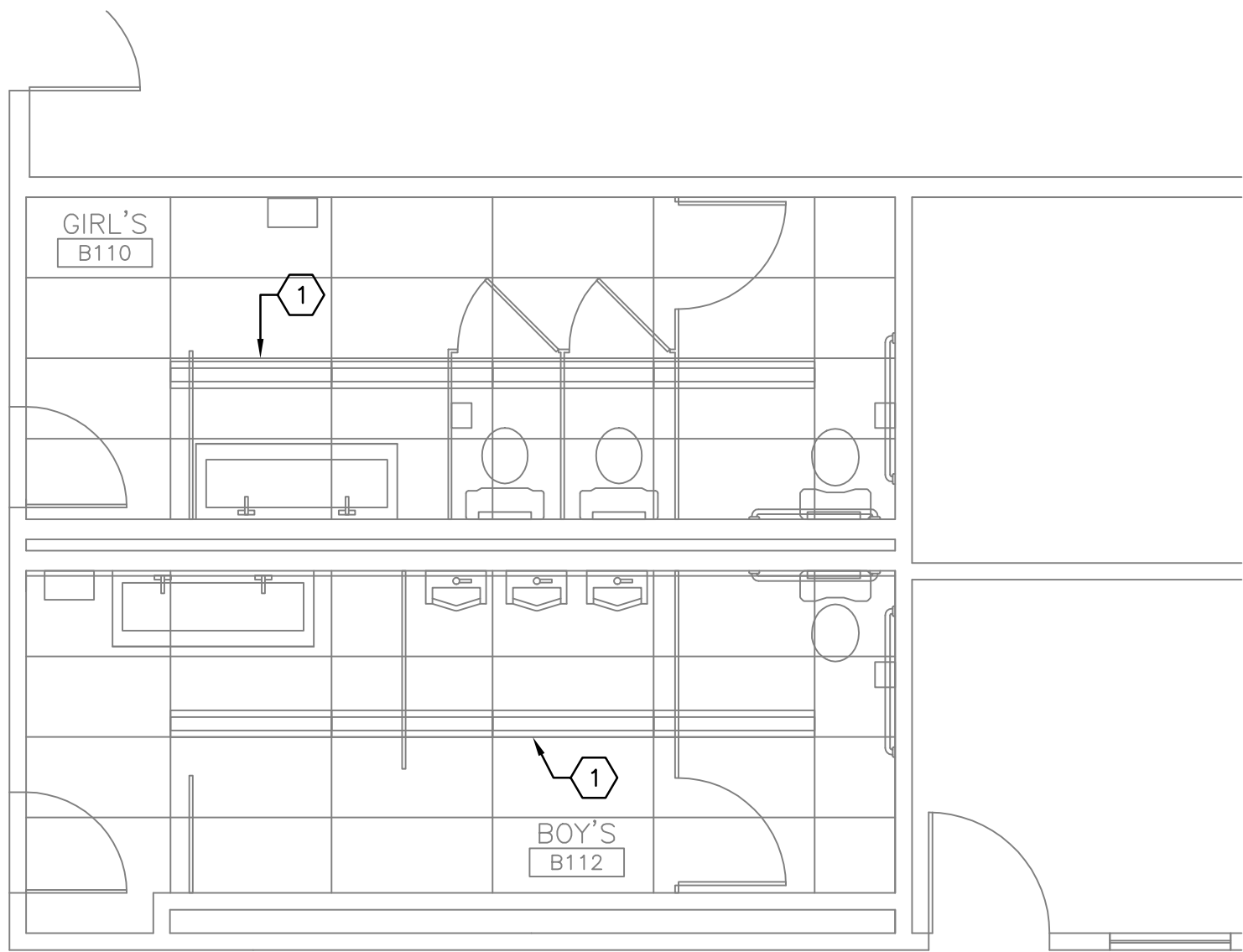
DEMO PLANS -  
ELECTRICAL

**E1.1**

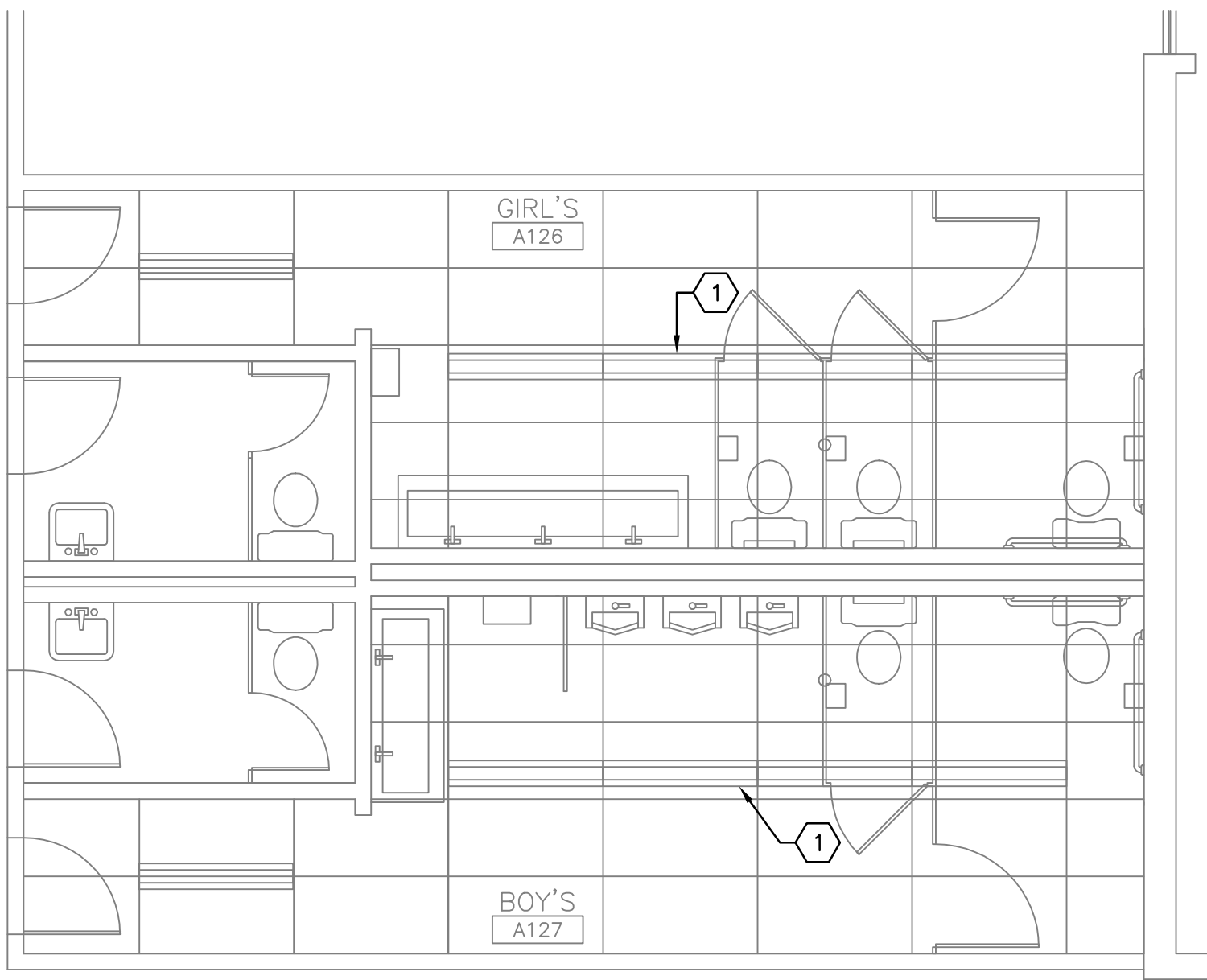
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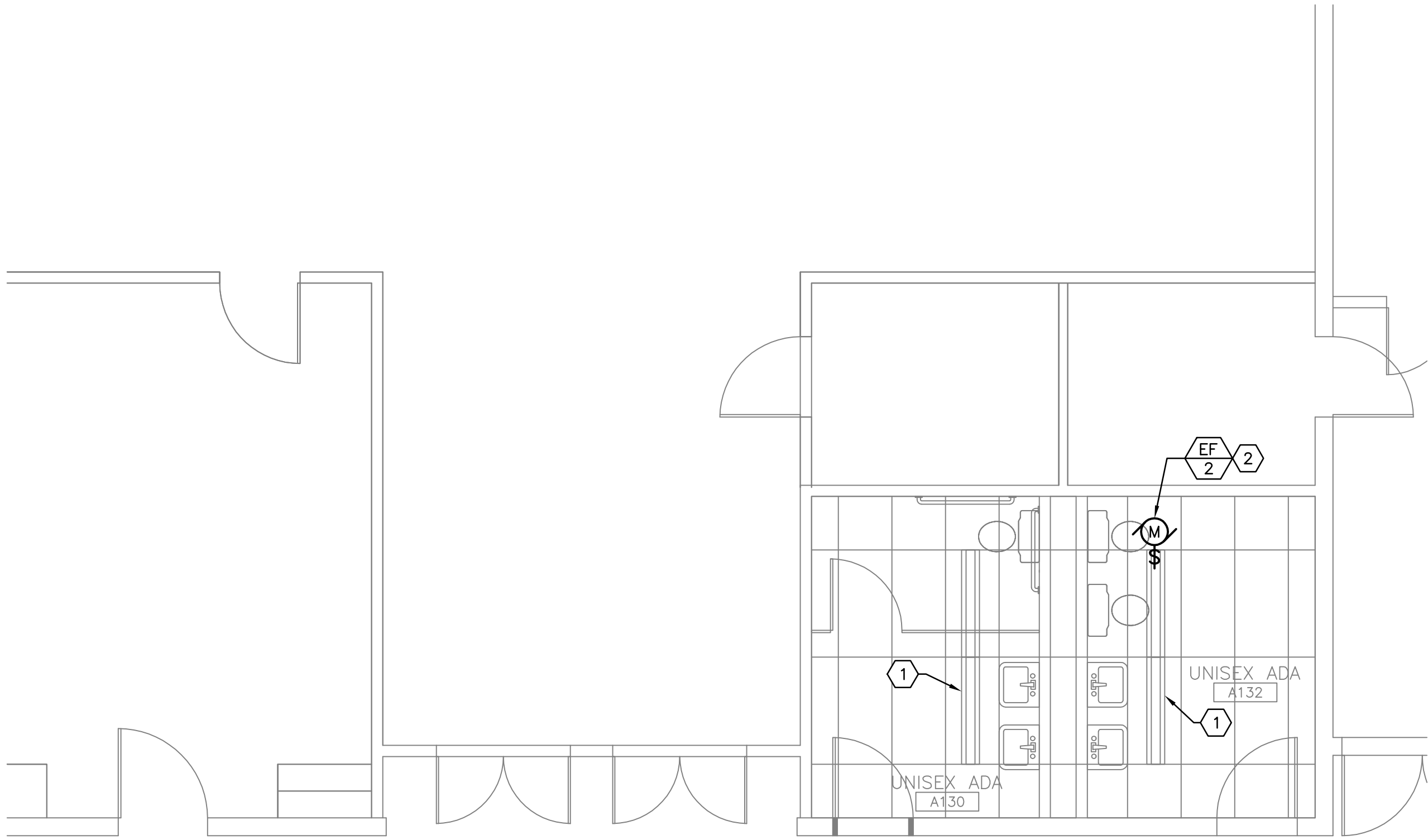
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1  
E1.2 ENLARGED FLOOR PLAN, B110 & B112 - ELECTRICAL  
SCALE: 1/4" = 1'-0"



3  
E1.2 ENLARGED FLOOR PLAN, A126 & A127 - ELECTRICAL  
SCALE: 1/4" = 1'-0"



2  
E1.2 ENLARGED FLOOR PLAN, A130 & A132 - ELECTRICAL  
SCALE: 1/4" = 1'-0"

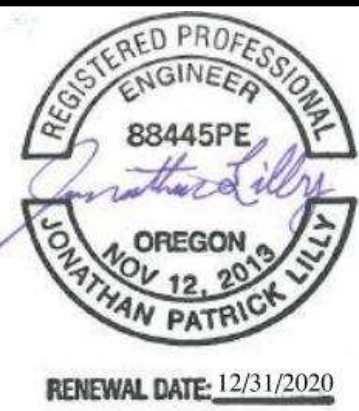


## GENERAL NOTES

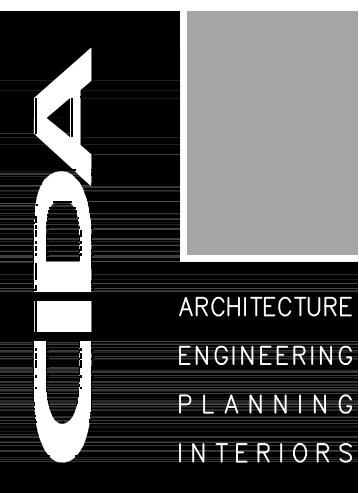
- A. SEAL ALL WALL PENETRATIONS TO MAINTAIN EXISTING FIRE RATING. ALL REPAIR WORK NEEDS TO BE PAINTED TO MATCH SURROUNDING SURFACES.
- B. HVAC/PLUMBING EQUIPMENT CONNECTION SCHEDULE CONTAINS: LOAD, VOLTAGE/PHASE, CIRCUITING, DISCONNECT & FEEDER DETAILS.
- C. VERIFY LOCATION AND ELECTRICAL REQUIREMENTS OF ALL MECHANICAL EQUIPMENT, PRIOR TO ROUGH-IN. CONNECT COMPLETE.

## NOTES THIS SHEET

- 1 EXISTING SURFACE MOUNTED LUMINAIRES TO REMAIN. PROTECT FROM DAMAGE DURING CONSTRUCTION.
- 2 VERIFY LOCATION AND ELECTRICAL REQUIREMENTS OF ALL MECHANICAL EQUIPMENT PRIOR TO ROUGH-IN. SEE HVAC/PLUMBING EQUIPMENT CONNECTION SCHEDULE ON THIS SHEET FOR DISCONNECT REQUIREMENTS. PROVIDE LOCAL DISCONNECTS IF NOT ALREADY INTEGRAL TO EQUIPMENT. SEE GENERAL NOTE B & C.



ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET



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TENANT IMPROVEMENT FOR:

**BSD OAK HILLS ELEMENTARY- TR REMODEL**

2625 NW 153RD. AVE.  
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ENLARGED PLANS -  
ELECTRICAL

**E1.2**

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SECTION 26 000  
ELECTRICAL

PART 1—GENERAL

1.1 SUMMARY

- A. Electrical systems required for this work includes labor, materials, equipment, and services necessary to complete installation of electrical work shown on Drawings, specified herein or required for a complete operable facility and not specifically described in other Sections of these Specifications. Among the items required are:
1. Branch circuit wiring from the distribution panels for lighting, and other detailed circuit wiring.
  2. Luminaires, control switches, supports and other accessory items.
- B. Fees:
1. Obtain and pay for electrical permits and inspections from local authorities having jurisdiction (AHJs).

1.2 DEFINITIONS

- A. Provide: To furnish and install, complete and ready for the intended use.
- B. Furnish: Supply and deliver to the project site, ready for unpacking, assembly and installation.
- C. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at the project site as required to complete items of work furnished by others.

1.3 SUBMITTALS

- A. Operation and Maintenance Documentation: Provide copies of certificates of code authority acceptance, test data, product data, guarantees, warranties, and the like.
- B. Shop Drawings: Provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and the like.
- C. Record Drawings: Show changes and deviations from the Drawings. Include written Addendum and change order items. Make changes to Drawings in a neat, clean, and legible manner.
- D. Provide training for appropriate District personnel. Training will review complete Operations and Maintenance (O&M) Manual, including but not limited to, programming and setup of any control systems, required maintenance, and troubleshooting, including contact names and phone numbers for factory support.

1.4 QUALITY ASSURANCE

- D. Conform to requirements of the National Electric Code (NEC), latest adopted version with amendments by local AHJs.
- E. Conform to latest adopted version of the International Building Code (IBC) with amendments by local AHJs.
- F. Furnish products listed by Underwriters' Laboratories, Inc. (UL) or other testing firm acceptable to AHJ.
- G. Conform to requirements of the serving electric, telephone, and cable television utilities.

1.5 SEQUENCING AND SCHEDULING

- A. For the proper execution of the work cooperate with other crafts and contracts as needed.
- B. To avoid installation conflicts, thoroughly examine the complete set of Contract Documents. Resolve conflicts prior to installation.
- C. Prior to installation of feeders to equipment requiring electrical connections, examine the manufacturer's shop drawings, wiring diagrams, product data, and installation instructions. Verify that the electrical characteristics detailed in the Contract Documents are consistent with the electrical characteristics of the actual equipment being installed.

1.6 WARRANTY

- A. Driver Manufacturer's Warranty: 5 years for electronic type drivers, based on date of manufacturer embossed on drivers, current with installation date. Warranty includes normal cost of labor for replacement of driver.
- B. Contractor shall guarantee all provided workmanship and materials for 12—months after project closeout.

1.7 SAFETY

1. Electrical Equipment  
Secure and limit access to all energized electrical equipment. Electrical equipment and panels shall be behind closed doors or in non-public access areas.
2. Hazardous Materials  
Including, but not limited to, fluorescent lamps and PCB containing transformers, ballasts and fixtures, must be handled and disposed of in compliance with all applicable environmental regulations. Notify the Owner and file all required reports upon discovery of any hazardous materials. All handling or disposal of hazardous materials must be documented and handled in compliance with all current EPA and Oregon DEQ requirements and regulations.

3. Outages

- A minimum of seven calendar days, in advance, coordinate all electrical service outages with the District and the power company.
- Confirm outage times with BSD Representative, in advance, a minimum of 48 hours. Plan all work so that the duration of outage is kept to an absolute minimum. Provide temporary wiring as required in order to maintain continuous service to occupied portions of the building during business hours.

1.8 DEMOLITION AND SALVAGE

1. Salvage  
BSD has first rights of salvage for equipment and materials removed during construction. Coordinate project specific details with the BSD Representative.

PART 2—PRODUCTS

2.1 MATERIALS

- A. Provide new electrical materials of the type and quality detailed, listed by UL, bearing their label wherever standards have been established. Indicated brand names and catalog numbers are used to establish standards of performance and quality. The description of materials listed herein governs in the event that catalog numbers do not correspond to materials described herein.
- B. Include special features, finishes, accessories, and other requirements as described in the Contract Documents regardless of the item's listed catalog number.
- C. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system or systems, in a safe and satisfactory working condition.
- D. Firestopping Foam Sealant: Foam sealant for use around conduit penetrations to prevent passage of smoke, fire, toxic gas or water. Maintain seal before, during and after fire. In and around conduit for thermal break at penetration of barrier between heated and unheated spaces. Chase Technology Corporation CTC PR—855, Fire Foam, Thomas & Betts.

2.2 RACEWAYS

- A. Galvanized Rigid Steel Conduit (GRC): Federal Specification WWC—581 and American National Standards Institute (ANSI) C80.1.
- B. Intermediate Metal Conduit (IMC): Federal Specification WWC—581.
- C. Electrical Metallic Tubing (EMT): Federal Specification WWC—563 and ANSI C80.3.
- D. Flexible Conduit: Reduced wall flexible steel conduit. Federal Specification WWC—566.
- E. Conduit Fittings:
1. Bushings: Malleable iron with plastic insulator lining, 150C rated.
  2. Ground Bushings: Malleable iron with plastic insulating liner and aluminum grounding lug rated for copper or aluminum conductor, 150C rated.
  3. EMT Connectors and Couplings:
    - a. Set Screw Type: Zinc plated steel, insulated throat connectors.
    - b. Compression Type: Zinc plated steel, insulated throat connectors, raintight up to 2—inch.

2.3 WIRES AND CABLES

- A. Copper, 600 volt rated throughout. Conductors 14AWG to 10AWG, stranded. Conductors 8AWG and larger, stranded. Phase color to be consistent at feeder terminations; A—B—C, top to bottom, left to right, front to back. Conductors 3AWG and larger, minimum insulation rating of 75C. Insulation types THWN, THHN or XHHW. Minimum insulation rating of 90C for branch circuits.
- B. MC Cable: High strength galvanized steel or aluminum flexible armor. Full length minimum size No. 12 copper ground wire, THHN 90C conductors, full length tape marker. Overall PVC or nylon cable tape. Short circuit throat insulators.
- C. Manufacturers: Alfex, AFC, or Corak. AC/MC cable allowed only for 20 amp branch circuits concealed in accessible building void, walls or ceiling space.
- D. Type NM, type NMC, and type NMS cables: Annealed copper conductors, 600 volt rated. Minimum Size No. 12 with ground wire for 20A. 90C rated PVC, nylon jacketed insulation per NEC Article 334; protect from damage per NEC Article 300.4. 50 Cable: Annealed copper conductors, 600 volt rated. Minimum size No. 12, with ground wire. Maximum of six current carrying conductors and ground per cable. 90C rated thermoset jacket. Manufacturers: Tiger Brand.

2.4 BOXES

- A. Luminaire Outlet: 4—inch octagonal box, 1.5—inches deep with 3/8—inch luminaire stud if required. Provide raised covers on bracket outlets and on ceiling outlets.
- B. Device Outlet: Minimum 4—inch square, minimum 1.5—inches deep. Single or 2—gang flush device raised covers. Raco Series 681 and 686 or Bowers.
- C. Multiple Devices: Three or more devices at common location. Install 1—piece gang boxes with 1—piece device cover, one device per gang.
- D. Junction and Pull Boxes: Galvanized sheet steel junction and pull boxes, with screw—on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equiped with steel nuts, bolts, screws and washers.
- E. Provide J—box(es) per NEC Article 314; provide listed NM fitting.

2.5 WIRING DEVICES

- A. Finish: Stainless steel with label per 2.6A.
- B. Wall Switches: Toggle type, quiet acting, 20 amp, 120/277 volt, UL listed for motor loads up to 80 percent of rated amperage. Arrow—Hart 1221, Leviton 1221, Pass & Seymour 20ACI, Bryant 4901, Hubbell 1221.
- C. Receptacles: Straight parallel blade 20amp, 2—pole, 3—wire grounding Arrow—Hart 5352, Leviton 5352, Hubbell 5352.

2.6 ELECTRICAL IDENTIFICATION

- A. Engraved Labels: Melamine plastic laminate, white with black core, 1/16—inch thick, manufactured by Lamicoid. Engravers standard letter style, minimum 3/16—inch high letters. Drill or punch labels for mechanical fastening except where adhesive mounting is necessary because of substrate. Use self tapping stainless steel screws.
- B. Conductor Numbers: Manufacturers standard vinyl—cloth self—adhesive cable and conductor markers of the wraparound type.
- C. Branch Circuit Schedules: Provide branch circuit identification schedules, typewritten, clearly filled out, to identify load connected to each circuit and location of load.

2.7 GROUNDING MATERIALS

- A. Grounding Connectors: Hydraulic compression tool applied connectors or exothermic welding process connectors or powder actuated compression tool applied connectors. Mechanical type of connectors are not acceptable. Manufacturers: Burndy Hyground Compression System, Erico/Cadweld, Thomas & Betts or approved.
- B. Pipe Grounding Clamp: Mechanical ground connector with cable parallel or perpendicular to pipe.
- C. Evaluate existing grounding and upgrade existing grounding electrode system at main service and dry—type transformers, if necessary, to meet current code requirements. Include re—bonding of main service ground bus to new ground rods.
- D. The Contractor shall extend existing grounding electrode systems and equipment grounding systems.

2.8 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers: One, two or three—pole bolt on, single handle common trip, rated 15 to 600 amp, indicated on Drawings. Overcurrent toggle—type mechanism, quick—make, quick—break action. Trip indication is by handle position. Calibrate for operation in 40C ambient temperature.

2.9 LUMINAIRES

- A. Luminaires: Refer to description and manufacturers in Luminaire Schedule.
- B. Where recessed luminaires are installed in cavities intended to be insulated, provide IC rated luminaires or other code approved installation.
- C. Recessed Luminaires: Frame compatible with the ceiling material installed at the particular luminaire location.
- D. Light Transmitting Components: Prismatic acrylic, extruded, flat diffusers, 0.125—inch overall thickness, unless otherwise noted.

2.10 LED LIGHT FIXTURES

- A. General:
1. LED light fixtures shall be in accordance with IES, NFPA, UL, as shown on the drawings, and as specified.
  2. LED light fixtures shall be reduction of hazardous substances (ROHS) —compliant.
  3. LED drivers shall include the following features unless otherwise indicated:
    - a. Minimum Efficiency: 85% AT FULL LOAD.
    - b. Minimum Operating Ambient Temperature: —20° C. (—4° F.)
    - c. Input Voltage: 120—277V (±10%) AT 60 HZ.
    - d. Integral Short Circuit, Open Circuit, and Overload Protection.
    - e. Power Factor: ≥ 0.95.
    - f. Total Harmonic Distortion: ≤ 20%.
    - g. Comply with FCC 47 CFR Part 15.
  4. LED modules shall include the following features unless otherwise indicated:
    - a. Comply with IES LM—79 and LM—80 requirements.
    - b. Minimum CRI80 and color temperature 3000°K unless otherwise specified in lighting fixture schedule.
    - c. Minimum Rated Life: 50,000 hours per IES L70.
    - d. Light output lumens as indicated in the lighting fixture schedule.
- B. LED Downlights:
1. Housing, LED Driver, AND LED Module shall be products of the same manufacturer.
- C. LED Troffers:
1. LED Drivers, Modules, and Reflector shall be accessible, serviceable, and replaceable from below the ceiling.
  2. Housing, LED Driver, and LED Module shall be products of the same manufacturer.
- D. General Lighting Needs
- Light Emitting Diodes (LED) lighting shall be used as the basis of design for all new and remodel projects, excluding special use lighting as required.

- a. LED light fixtures should be DLC, IESNA, and UL listed luminaires
- b. LED light fixtures should be Energy Star rated
- c. 100 lumens/watt minimum
- d. LED Fixtures shall be dimmable 0—10V, DMX or ACN
- e. Drivers should be easily replaceable; for fixtures in hard to reach areas, drivers shall be remote, and located in accessible area approved by BSD representative
- f. Minimum 5—year warranty
- g. Approved manufacturers: Acuity/Lithonia, Eaton/Cooper Industries, ETC or Philips

PART 3—EXECUTION

3.1 EXAMINATION

- A. Drawings are diagrammatic with symbols representing electrical equipment, outlets, luminaires, and wiring. Examine the entire set of Drawings to avoid conflicts with the other systems. Determine exact route and installation of electrical wiring and equipment with conditions of construction.
- B. Clarification:
1. The Drawings govern in matters of quantity, the Specification in matters of quality. In event of conflict on Drawings or in the Specifications, the greater quantity and the higher quality apply.
  2. Should the Electrical Documents indicate a condition conflicting with the governing codes and regulations, refrain from installing that portion of the work until clarified by Architect.

3.2 UTILIZATION BRANCH CIRCUIT WIRING

- A. Electrical Connections: Connect equipment, whether furnished by Owner or other Divisions of the Contract, electrically complete.

3.3 INSTALLATION

- A. Install electrical equipment complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough—in of the electrical equipment, examine the instructions thoroughly.
- B. Noise Control: Do not place outlet boxes at opposite side of partitions or walls back to back. Do not place contactors, transformers, starters or similar noise producing devices on walls which are common to occupied spaces unless specifically called for on Drawings. Where such devices must be mounted on walls common to occupied spaces, mount or isolate in such a manner as to effectively prevent the transmission of their inherent noise to the occupied space.
- C. Firestopping: Coordinate with the Drawings the location of fire rated walls, ceilings, floors and the like. When these assemblies are penetrated by electrical equipment, seal around the equipment with approved firestopping material. Install firestopping material complete as directed the manufacturer's installation instructions.
- D. Conduit:
1. Conceal conduits. Exposed conduits are permitted only in the following areas: Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished materials. Existing walls that are concrete or block construction and where specifically noted on the Drawings.
  2. Do not install conduits on surface of building exterior, across roof, on top of parapet walls, or across floors.
  3. Below Grade Conduit and Cables: Place a minimum 3—inch cover of sand or clean earth fill around the cable or conduit on a leveled trench bottom. Lay conduit on a smooth level trench bottom, so that contact is made for its entire length. Remove water from trench before electrical conduit is installed.
  4. Conduit Terminations: Provide conduits shown on Drawings which terminate without box, panel, cabinet or conduit fitting with conduit connector or bushing.
  5. Conduit Size: Minimum trade size 1/2—inch.
  6. Provide pull cord in empty conduits.
  7. Conduit Use Locations:
    - a. Underground: PVC.
    - b. Cast—in—Place Concrete, Masonry, Damp Locations and Subject to Mechanical Damage: GRC or IMC.
    - c. Dry, Protected: GRC, IMC, EMT.
    - d. Sharp Bends and Elbows: GRC, EMT use factory elbows.
    - e. Motors, recessed luminaires and equipment connections subject to movement or vibration, use flexible metallic conduit.
    - f. Motors and equipment connections subject to movement or vibration and subjected to the following conditions: exterior location, moist or humid atmosphere, water spray, oil or grease use PVC coated light tight flexible metallic conduit.
    - g. MC cable to be installed vertically in wall from j—box up to accessible building void space unless other wise noted. MC cable only for single branch circuits within room.
  8. Branch Circuits: Do not change the intent of the branch circuits or controls without approval. Homerun for 20 amp branch circuits may be combined to a maximum of six conductors in a homerun. Apply derating factors as required by NEC 310. Increase conductor size as needed.
  9. One—piece boxes and one—piece device covers are required  
Minimum box sizes: Galvanized steel, 4" square, 1½" deep  
Signal system outlets' minimum box size: 4" square, 2½" deep
  10. Limit use of floor boxes for specific applications only. All floor boxes shall be code—approved metal construction, with gasketed metal covers, flush with floor grade (even in use). No plastic boxes or components. Wiremold Omnibox Series, Hubbell Steel with adjustable collars and frames, or approved by BSD Representative. Minimum floor box requirements: 3 7/16" deep with 1" factory knockouts.

E. Wires and Cables:

1. Conductor Installation: Install conductors with care to avoid damage to insulation. Do not apply greater tension on conductors than recommended by manufacturer during installation.
2. Conductor Size and Quantity: Install no conductors smaller than 12AWG unless otherwise shown. Provide required conductors for a fully operable system.
3. MC Cable Allowed in the Following Locations Only: In areas where there is an accessible ceiling. Do not use in areas where there is no accessible ceiling.
  - a) Use only for branch circuits within a room space with accessible ceiling.
  - b) Not acceptable in kitchen or other wet environments
  - c) High strength galvanized steel of flexible armor, no aluminum
  - d) No conductors larger than 10AWG
  - e) There shall be no shared neutrals in any multi—wire branch circuits
  - f) Not acceptable under windows due to inaccessible replacement
4. Connectors:
  - a) Quick push—in wire connectors are prohibited 18AWG — 8AWG spring connector wire nuts to be used Terminal strips in J boxes are allowed
5. All splices, taps, and terminations shall be made in outlet, junction, or pull boxes. Wire to 8AWG shall be spliced using spring connector wire nuts. 6AWG and larger, use indent compression or split bolt connectors for all conductors. Splices 6AWG and larger shall be insulated to voltage rating of feeder or circuit. Splices shall not be permitted in automation input and output wiring.

F. Boxes:

1. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
2. Provide weatherproof outlets for locations exposed to weather or moisture.
3. Code Compliance: Comply with NEC as applicable to construction and installation of electrical boxes and fittings and size boxes according to NEC 370, except as noted otherwise.
4. Mount Center of Outlet Boxes as Required by Americans With Disabilities Act (ADA), or Noted on Drawings, the Following Distance above the Floor:
  - a. Control Switches: 48—inches.
  - b. Receptacles: 18—inches.
  - c. Telecom Outlets: 18—inches.
  - d. Other Outlets: As indicated in other Sections of Specifications or as detailed on Drawings.

- A. Provide NEC—required disconnect switches whether specifically shown on Drawings or not. Provide disconnect switch at each motor location within 5—feet unless otherwise noted. Coordinate fuse ampere rating with installed equipment. Fuse ampere rating variance between original design information and installed equipment, size in accordance with Bussmann Fusetron 40C recommendations.
- B. Supporting Devices:
1. Safety factor of 4 required for every fastening device or support for electrical equipment installed. Support to withstand four times weight of equipment it supports. Bracing to comply with Seismic Zone 3 requirements.
  2. Provide vertical support members for equipment and luminaires, straight and parallel to building walls. Provide independent supports to structural member for electrical luminaires, materials, or equipment installed in or on ceiling, walls or in void spaces or over furred or suspended ceilings.
- I. Electrical Identification:
1. Conductor Identification: Apply markers on each conductor for power, control, signaling and communications circuits.
  2. ENGRAVED LABELS  
Engraved labels shall be plastic laminate, black with white core. Install engraved label on each major unit of electrical equipment, including disconnects, services, distribution panels, and branch panel boards, main and satellite control panels of each signal system. Install engraved label on the inside of flush panels, visible when the door is opened. Minor components such as relays, contactors, time switches, override switches, etc., do not need to be engraved, but must be clearly labeled.
  3. RECEPTACLES AND SWITCHES  
On the finish plate, use a label, or legibly write with indelible ink on the back, the circuit to which each device is connected.
  4. JUNCTION AND PULL BOXES  
On the cover, use a label, or legibly write with indelible ink, the panel number, circuit number and voltage for each box.
  5. BRANCH CIRCUIT SCHEDULES  
Schedules shall be typewritten with separate columns for odd and even numbers, using final building room numbers and identifications. The A/E shall provide a list and drawing which cross—references the room numbers originally used on all plans and drawings with the final room numbers assigned by the District.
  - J. Service and Distribution: Existing 480Y/277V, 3 phase, 4 wire electrical panel. No load is added to branch circuit. These documents are based on as—builts that have not been verified. Contractor to verify all existing conditions prior to work.
  - K. Grounding:
    1. Performance Requirements: Supplement the grounded neutral of the secondary distribution system with an equipment grounding system to properly safeguard the equipment and personnel. Install equipment grounding such that metallic structures, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment and other conductive items in close proximity with electrical circuits operate continuously at ground potential and provide a low impedance path for possible ground fault currents.
    2. Raceway Grounding: Ground metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger grounding conductor is included with circuit, use grounding bushing with lay—in lug. Install ground bushings on metallic raceway terminations in pull boxes, panelboards and the like for circuits with overcurrent protection set at 60 amp and greater.
    3. Install equipment grounding conductor, code size minimum in nonmetallic and metallic raceway systems.
    4. Motors, Equipment and Appliances: Install code size equipment grounding conductor from outlet box to (motor) equipment frame or manufacturer's designated ground terminal.
    5. Receptacles: Connect ground terminal of receptacle to equipment ground system by No. 14 conductor bolted to outlet box. Self grounding nature of receptacle devices does not eliminate conductor bolted to outlet box.
  - L. Control Devices:
    1. Install time switches and other automatic control devices in accessible locations near the source of power or grouped at a common location in mechanical rooms or similar spaces.
    2. UL924 listed. On—board test switch for local inspection. If mounted above 60", a remote test switch is required below 60". If mounted above 60", and in a drop ceiling, remote test switch may be exposed through a ceiling which is 10' or lower. Indicator lights for presence of normal utility power, un—switched emergency power, and for when test switch is activated, causing emergency lamps to activate.
  - M. Lighting:
    1. Install luminaire of types indicated where shown and at indicated heights; in accordance with manufacturer's written instructions and with recognized industry practices.
    2. Avoid interference with and provide clearance for equipment. Where the indicated locations for the luminaires conflict with the locations for equipment, change the locations for the luminaire as directed by Architect.
    3. Provide lighting indicated on Drawings with a luminaire of the type designated and appropriate for the location. Where outlet symbols appear on Drawings without a type designation provide a luminaire the same as those used in similar or like locations.

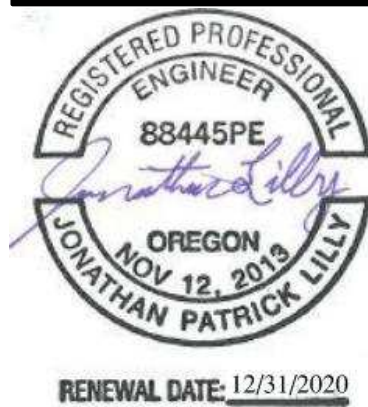
3.4 FIELD QUALITY CONTROL

- A. Tests: Conduct tests of equipment and systems to demonstrate compliance with requirements specified in Division 16. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.
- B. Verify electrical characteristics of equipment prior to installation of conduits and wiring for equipment.
- C. Coordinate HVAC voltage requirements with Drawings and equipment submittals prior to rough in.
- D. Wiring Device Tests: Test wiring devices to ensure electrical continuity of grounding connections, and after energizing circuitry, to demonstrate compliance with requirements. Test receptacles for line to neutral, line to ground and neutral to ground faults. Correct defective wiring.
- E. Verification of Conditions: Verify ceiling construction, recessing depth and other construction details prior to release of luminaire for shipment.
- F. Test each GFCI receptacle and each AFCI circuit breaker.

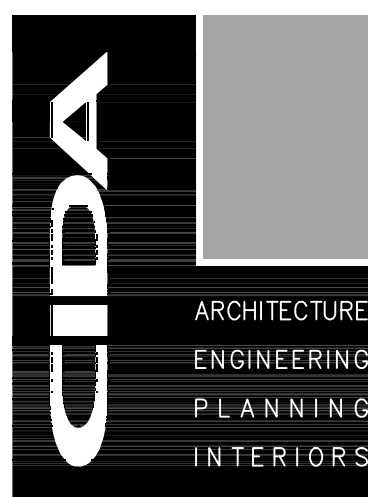
3.5 CLEANING

- A. Remove dirt and debris caused by the execution of the electrical work. Leave the entire electrical system installed in clean, dust—free and proper working order.
- B. Thoroughly clean the exterior and the interior of each switchboard and distribution panelboard in accordance with manufacturer's installation instructions.
- C. Where finish of luminaires or enclosures is damaged, touch up finish with matching paint in accordance to manufacturer's specifications and installation instructions.
- D. Clean paint splatters, dirt, dust, fingerprints, and debris from luminaires.

END OF SECTION



ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET



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TENANT IMPROVEMENT FOR:  
**BSD OAK HILLS ELEMENTARY- TR REMODEL**

2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

ELECTRICAL  
SPECIFICATION

**E2.0**

JOB NO. 20Y007.01

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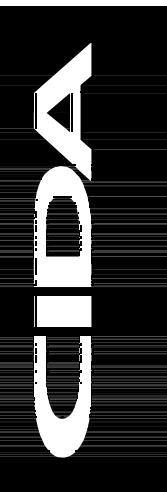
PLUMBING FIXTURE CONNECTION SCHEDULE ①									
MARK	FIXTURE	W	V	CW	HW	TW	MANUFACTURER	REMARKS	
WC-1	WATER CLOSET	4	2	1			KOHLER K-4350 SLOAN ROYAL 111 FLUSH VALVE	FLOOR MOUNTED, 1.6 GPF VALVE, ELONGATED, STD. HEIGHT, WHITE W/ WHITE OPEN FRONT SEAT.	
WC-2	WATER CLOSET ADA	4	2	1			KOHLER K-4368 SLOAN ROYAL 111 FLUSH VALVE	FLOOR MOUNTED, 1.6 GPF VALVE, ELONGATED, ADA HEIGHT, WHITE W/ WHITE OPEN FRONT SEAT.	
LV-1	LAVATORY	1-1/2	1-1/4	1/2	1/2		KOHLER K-2005 KINGSTON SYMMONS S-20-2-G FAUCET	WALL HUNG, RECTANGULAR, CHROME GRID STRAINER, P-TRAP, SUPPLIES & STOPS, WHITE, WALL HANGER. PROVIDE THERMOSTATIC MIXING VALVE	
WF-1	WASH FOUNTAIN	1-1/2	1-1/4	1/2	1/2		BRADLEY LVRD3-TMA VERGE CHICAGO FAUCET 3500-E2805ABCP	WALL MOUNTED, P-TRAP, SUPPLIES & STOPS, NAVIGATOR THERMOSTATIC MIXING ASSEMBLY.	
WF-2	WASH FOUNTAIN	1-1/2	1-1/4	1/2	1/2		BRADLEY LVRD2-TMA VERGE CHICAGO FAUCET 3500-E2805ABCP	WALL MOUNTED, P-TRAP, SUPPLIES & STOPS, NAVIGATOR THERMOSTATIC MIXING ASSEMBLY.	
① BRANCH PIPE SIZE TO FIXTURE SAME AS CONNECTION SIZE SHOWN ABOVE UNLESS INDICATED OTHERWISE ON DRAWINGS.									

PLUMBING LEGEND		
	CW	COLD WATER
	HW	HOT WATER
	HWR	HOT WATER RECIRC
	140	140°F HOT WATER
	140R	140°F HOT WATER RECIRC
	V	VENT
	W	SANITARY WASTE (ABOVE GRADE)
	W	SANITARY WASTE (BELOW GRADE)
	RD	RAIN DRAIN (ABOVE GRADE)
	RD	RAIN DRAIN (BELOW GRADE)
	G	NATURAL GAS
B.G. BELOW GRADE		
DS DOWN SPOUT		
(E) EXISTING		
(N) NEW		
(R) REMOVE		
VTR VENT THRU ROOF		
CO FLOOR CLEANOUT		
COTG CLEANOUT TO GRADE		
WCO WALL CLEANOUT		
BALL VALVE		
CHECK VALVE		
HOSE BIBB		
WH-1 PLUMBING FIXTURE MARK NO. SEE PLUMBING FIXTURE CONNECTION SCHEDULE.		
SHEET NOTE		
CONNECT TO EXISTING AT THIS POINT. VERIFY EXACT LOCATION, SIZE AND CONDITION.		



ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET

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Project No.: 382.118.001  
Contact: DWAYNE JOHNSON



ARCHITECTURE  
ENGINEERING  
PLANNING  
INTERIORS

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TENANT IMPROVEMANT FOR:

**BSD OAK HILLS ELEMENTARY- TR REMODEL**

2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

COVER SHEET PLUMBING

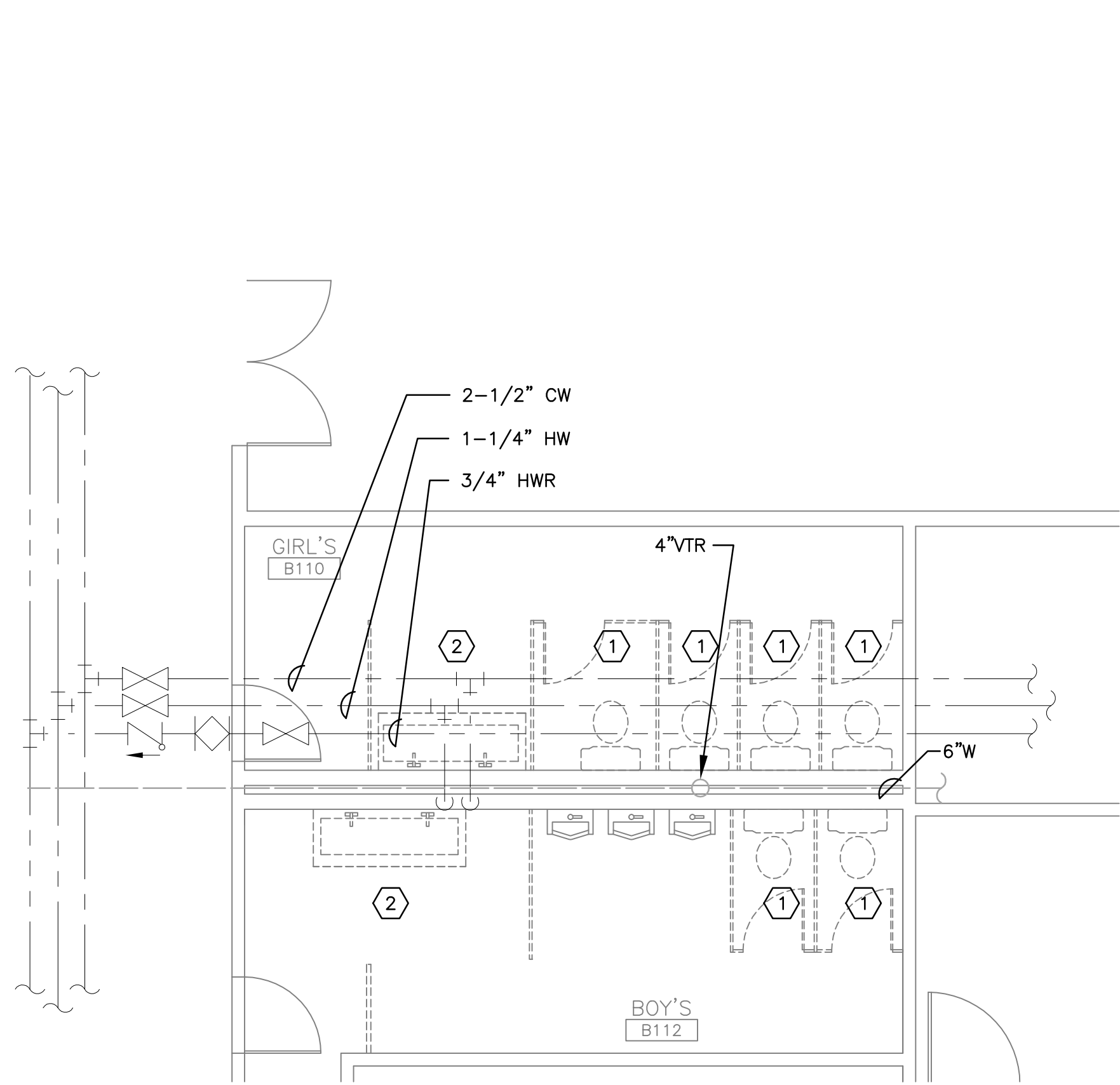
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JOB NO. 20Y007.01

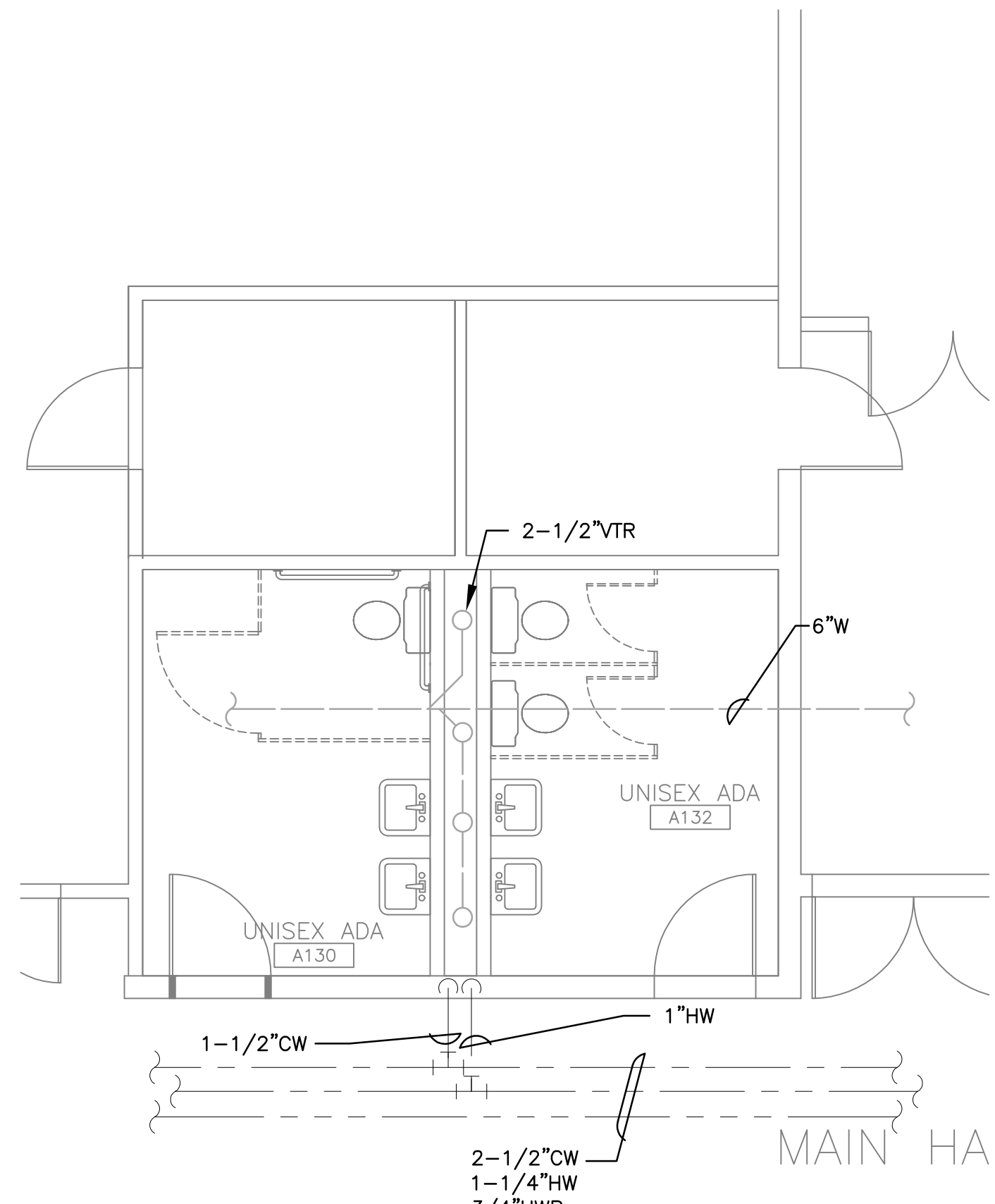
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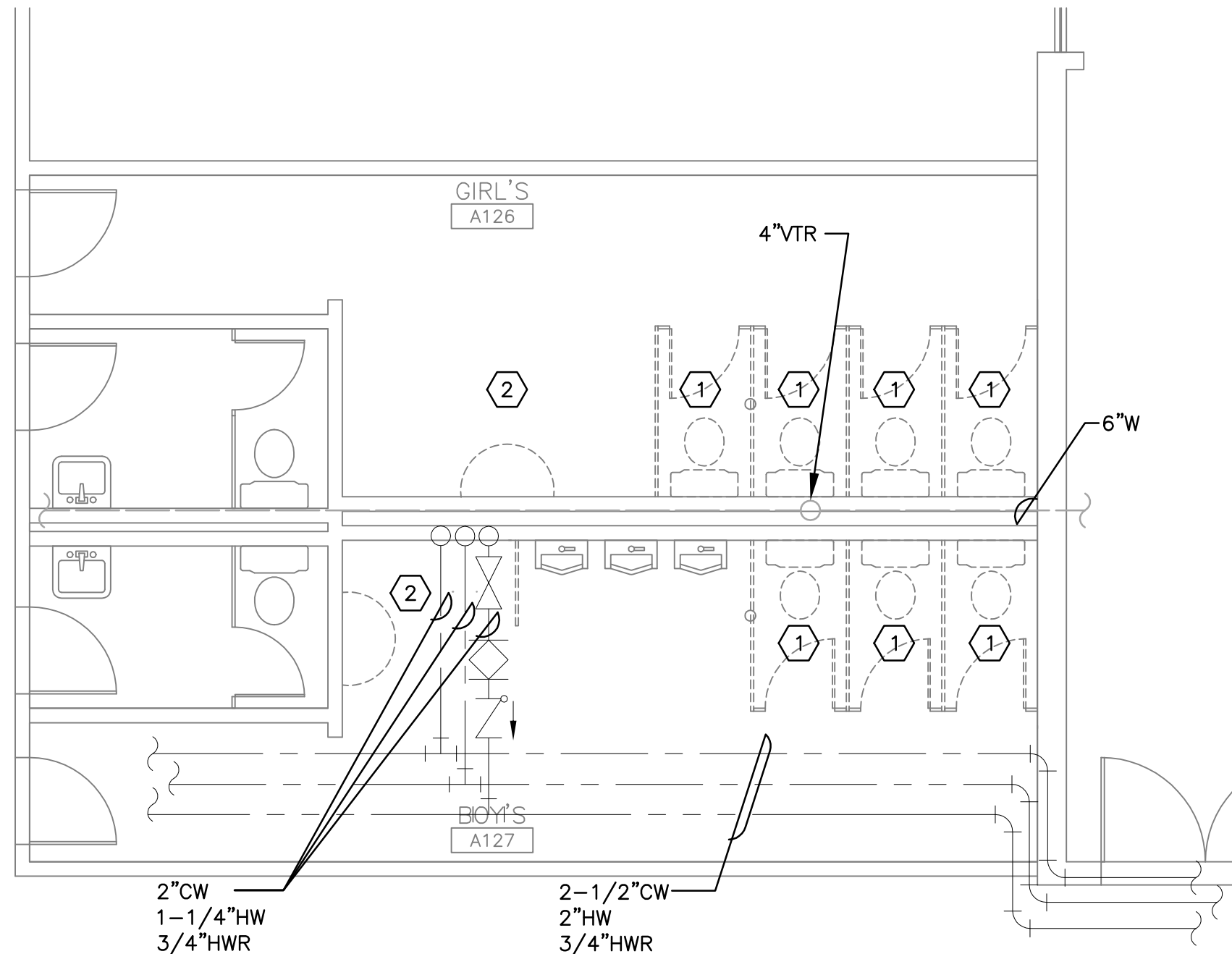
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1 DEMO FLOOR PLAN, B110 & B112 - PLUMBING  
P1.1 SCALE: 1/4" = 1'-0"



2 DEMO FLOOR PLAN A130 & A132 - PLUMBING  
P1.1 SCALE: 1/4" = 1'-0"



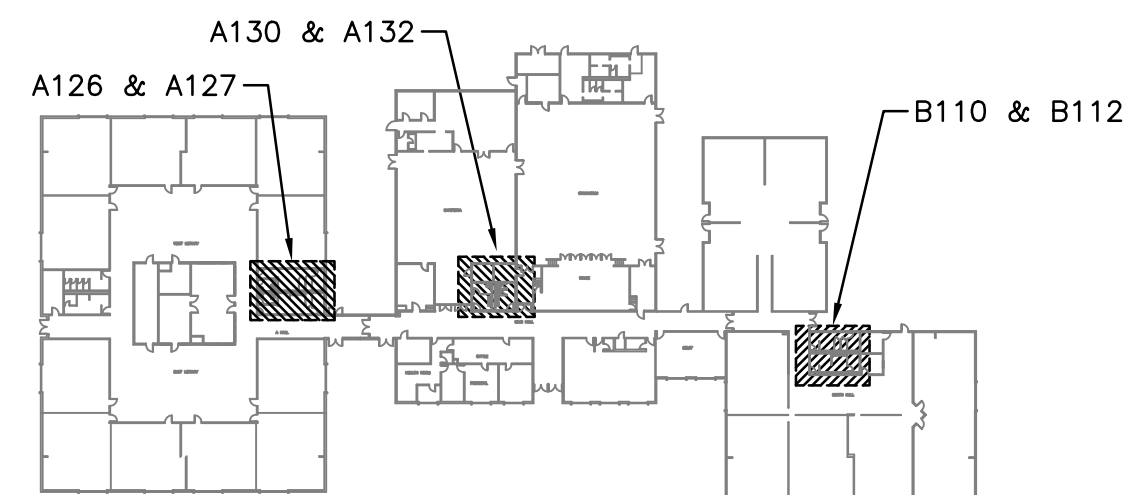
3 DEMO FLOOR PLAN, A126 & A127 - PLUMBING  
P1.1 SCALE: 1/4" = 1'-0"

## GENERAL NOTES

- A. DRAWINGS ARE DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND, TEE, OR ELBOW WHICH MAY BE REQUIRED TO INSTALL WORK IN THE SPACE PROVIDED. DO NOT SCALE DRAWINGS FOR ROUGH-IN MEASUREMENTS, NOR USE AS SHOP DRAWINGS. MAKE FIELD MEASUREMENTS AND PREPARE SHOP DRAWINGS AS REQUIRED. COORDINATE WORK WITH SHOP DRAWINGS OF OTHER TRADES. PROVIDE ANY BENDS, OFFSETS AND ELBOWS WHERE REQUIRED BY LOCAL CONDITIONS FROM MEASUREMENTS TAKEN AT THE BUILDING (SUBJECT TO APPROVAL) AND WITHOUT ADDITIONAL COST TO THE PROJECT. THE RIGHT IS RESERVED TO MAKE ANY REASONABLE CHANGES IN OUTLET LOCATION PRIOR TO ROUGH-IN.
- B. CONTRACTOR IS TO FIRE CAULK ALL PIPING PENETRATIONS THRU FIRE RATED WALLS.

## NOTES THIS SHEET

- 1 PLUMBING CONTRACTOR TO DEMO EXISTING WATER CLOSET. EXISTING WASTE TO BE CAPPED BELOW FLOOR AND EXISTING WATER TO BE CAPPED IN WALL FOR FUTURE CONNECTION TO NEW WATER CLOSET.
- 2 PLUMBING CONTRACTOR TO DEMO EXISTING LAVATORY. EXISTING WASTE TO BE CAPPED IN WALL AND EXISTING WATER TO BE CAPPED IN WALL FOR FUTURE CONNECTION TO NEW WASH FOUNTAIN.



KEY PLAN



ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET

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"Engineering Integrated Solutions"  
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Project No.: 382.118.001  
Contact: DWAYNE JOHNSON



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TENANT IMPROVEMENT FOR:

**BSD OAK HILLS ELEMENTARY- TR REMODEL**

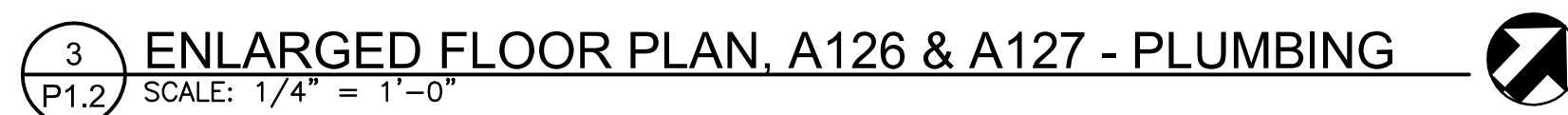
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BEAVERTON, OREGON 97006

DEMO PLANS -  
PLUMBING

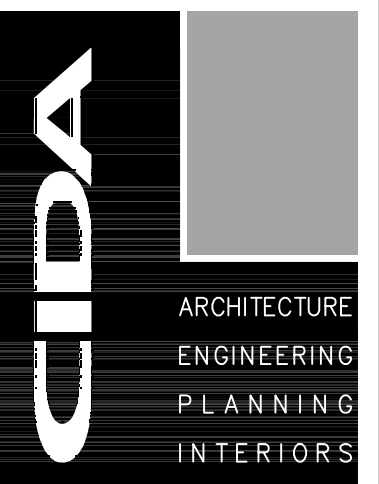
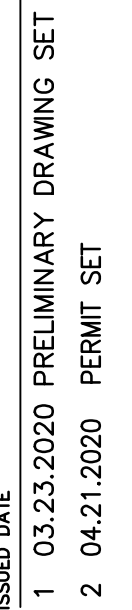
**P1.1**

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- ① PLUMBING CONTRACTOR TO CONNECT NEW WATER CLOSET TO EXISTING WASTE BELOW FLOOR, TO EXISTING VENT IN WALL AND TO EXISTING COLD WATER IN WALL.
- ② PLUMBING CONTRACTOR TO CONNECT NEW WASH FOUNTAIN TO EXISTING WASTE BELOW FLOOR, TO EXISTING VENT IN WALL AND TO EXISTING HOT AND COLD WATER IN WALL.
- ③ PLUMBING CONTRACTOR TO PROVIDE AND INSTALL NEW LINE SIZE SHUT-OFF VALVES ON EXISTING HOT AND COLD WATER SUPPLIES.



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TENANT IMPROVEMENT FOR:

# BSD OAK HILLS ELEMENTARY- TR REMODEL

2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

ENLARGED PLANS -  
PLUMBING

## P1.2

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SECTION 15010 – GENERAL PROVISIONS

PART 1 – GENERAL

1.1 SCOPE OF WORK: THE WORK COVERED BY THIS SPECIFICATION SHALL INCLUDE FURNISHING ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES TO CONSTRUCT AND INSTALL THE COMPLETE MECHANICAL SYSTEM AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN. VERIFY ALL CONDITIONS ON THE JOB SITE AND LAY OUT WORK ACCORDINGLY.

1.2 QUALITY ASSURANCE

- A. REGULATORY REQUIREMENTS:
- ALL WORK, INSTALLATIONS, MATERIALS AND EQUIPMENT SHALL COMPLY WITH THE PROVISION OF THE FOLLOWING CODES, STANDARDS AND REGULATIONS.
    - STATE OF OREGON MECHANICAL SPECIALTY CODE. (MSC)
    - STATE OF OREGON PLUMBING SPECIALTY CODE. (UPC)
    - STATE OF OREGON STRUCTURAL SPECIALTY CODE. (IBC)
    - NATIONAL ELECTRICAL CODE. (NEC)
    - NATIONAL FIRE PROTECTION AGENCY. (NFPA)
    - ALL CITY, COUNTY, STATE AND FEDERAL APPLICABLE LAWS AND REGULATIONS.
    - REGULATIONS AND STANDARDS SET FORTH BY ASME, ASHRAE, SMACNA, AGA AND ARI.
  - ELECTRICAL PRODUCTS SHALL BEAR THE U.L. LABEL.

1.3 PROJECT CONDITIONS:

- A. EXISTING CONDITIONS: PRIOR TO BIDDING, VERIFY AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS BY VISITING THE SITE AND INCLUDE ALL FACTORS WHICH MAY AFFECT THE EXECUTION OF THIS WORK. INCLUDE ALL RELATED COSTS IN THE INITIAL BID PROPOSAL.
- B. COORDINATE EXACT REQUIREMENTS GOVERNED BY ACTUAL JOB CONDITIONS. CHECK ALL INFORMATION AND REPORT ALL DISCREPANCIES BEFORE FABRICATION WORK. REPORT CHANGES IN THE TIME TO AVOID UNNECESSARY WORK. MAKE CHANGES AS DIRECTED BY OWNER'S REPRESENTATIVE.

1.4 WARRANTY:

- A. PROVIDE A WRITTEN GUARANTY COVERING THE WORK OF THIS DIVISION FOR A PERIOD OF ONE CALENDAR YEAR FORM THE DATA OF ACCEPTANCE OF THE ENTIRE PROJECT AS REQUIRED BY THE GENERAL PROVISIONS.
- B. PROVIDE MANUFACTURER'S WRITTEN WARRANTIES FOR MATERIAL AND EQUIPMENT FURNISHED UNDER THIS DIVISION INSURING PARTS AND LABOR FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE OF THE ENTIRE PROJECT.
- C. CORRECT WARRANTY ITEMS PROMPTLY UPON NOTIFICATION.

1.5 OPERATIONS AND MAINTENANCE DATA:

- A. PRIOR TO FINAL INSPECTION, PROVIDE THREE (3) COPIES OF MANUFACTURER'S MAINTENANCE MANUALS FOR EACH PIECE OF EQUIPMENT OR ITEMS REQUIRING SERVICE. MANUAL SHALL INCLUDE MANUFACTURER'S OPERATION AND MAINTENANCE INSTRUCTION MANUALS AND PARTS LIST FOR EACH PIECE OF EQUIPMENT OR ITEM REQUIRING SERVICING. INCLUDE IN THE MANUAL MANUFACTURER'S SERVICE DATA, WIRING DIAGRAMS AND PARTS LISTS FOR ALL MAJOR ITEMS OF EQUIPMENT, VALVE CHARTS, BALANCING DATA, FINAL CONTROL DIAGRAMS SHOWING FINAL SET POINTS AND ANY ADDITIONAL EQUIPMENT ADDED BY CONTRACT MODIFICATION. COMPLY WITH PROVISIONS OF SECTION 01700 WHERE APPLICABLE.
- B. SUBMIT BOUND IN 8-1/2 X 11 INCH TEXT PAGES, THREE RING BINDERS WITH DURABLE PLASTIC COVERS.
- PREPARE BINDER COVERS WITH PRINTED TITLE "OPERATION AND MAINTENANCE INSTRUCTIONS", TITLE OF PROJECT, AND SUBJECT MATTER OF BINDER WHEN MULTIPLE BINDERS ARE REQUIRED.
  - INTERNALLY SUBDIVIDE THE BINDER CONTENTS WITH PERMANENT PAGE DIVIDERS, LOGICALLY ORGANIZED WITH TAB TITLING CLEARLY PRINTED UNDER REINFORCED LAMENTED PLASTIC TABLE.

1.6 SUBMITTALS:

- A. SHOP DRAWINGS: THE CONTRACT DRAWINGS INDICATE THE GENERAL LAYOUT OF THE PIPING, DUCTWORK AND VARIOUS ITEMS OF EQUIPMENT. PREPARE AND SUBMIT FOR REVIEW SHOP DRAWINGS OF ALL INSTALLATION NOT DETAILED ON THE CONTRACT DRAWINGS AND ALL CHANGES TO THE CONTRACT DRAWINGS.
- B. PRODUCT DATA:
- SUBMIT FOR REVIEW MANUFACTURER'S DETAILED SHOP DRAWINGS, SPECIFICATIONS AND STAT SHEETS FOR ALL EQUIPMENT TO BE FURNISHED, AS WELL AS ANY WIRING DIAGRAM SHOWING FIELD INSTALLED WIRING AND DEVICES. ARRANGEMENT OF MECHANICAL EQUIPMENT HAS BEEN BASED ON ITEMS OF SPECIFIC MANUFACTURER INTENDED AS SOMEWHAT TYPICAL OF SEVERAL MAKES, WHICH MAY BE APPROVED.
  - INDICATE CONSTRUCTION, CAPACITIES, ACCESSORIES, ETC. MANUFACTURER'S ABBREVIATIONS OR CODES ARE NOT ACCEPTABLE.
  - LIST THE NAME OF THE MOTOR MANUFACTURER FOR EACH PIECE OF EQUIPMENT.
- C. SUBMISSION REQUIREMENTS:
- SHOP DRAWINGS AND PRODUCT DATA:
    - SUBMIT ALL EQUIPMENT AND PRODUCT DATA FOR WORK OF DIVISION 15 TOGETHER IN A GROUP IN A 3-RING LOOSE-LEAF BINDER, WITH EACH ITEM FIELD UNDER A TAB, AND LABELED WITH ITS RESPECTIVE SPECIATION SECTION NUMBER, ARTICLE AND PARAGRAPH, AND MARK IF APPLICABLE.
    - INCLUDE A COMPLETE INDEX IN THE ORIGINAL SUBMITTAL. INDICATE BOTH ORIGINAL ITEMS SUBMITTED AND NOTE STRAGGLERS THAT WILL BE SUBMITTED AT A LATER DATE TO AVOID DELAY IN SUBMITTING.
    - ADDITIONAL PRODUCT DATA SUBMITTED AFTER RETURN OF THE ORIGINAL BINDER SHALL INCLUDE A TAB SIMILAR TO THE ORIGINALLY SUBMITTED. UPON RECEIPT OF THE RETURN SUBMITAL, INSERT THEM IN THE PREVIOUSLY SUBMITTED BINDER.
    - REFER TO SECTION 01340 FOR NUMBER OF SHOP DRAWING COPIES TO BE SUBMITTED.
    - INDICATION OF UNIT, MODEL, FEATURES, ETC BEING SUBMITTED MUST BE MARKED BY BOLD ARROW, BOLD CIRCLE OR OTHER CLEAR MEANS THAT WILL REPRODUCE IN BLACK AND WHITE. USE OF HIGHLIGHTS, COLORED TEXT OR OTHER COLORED INDICATORS CANNOT BE USED.
  - SAMPLE: SUBMIT SAMPLES REQUIRED BY EACH SECTION OF DIVISION 15 AT THE SAME TIME THAT SHOP DRAWINGS AND PRODUCT DATA ARE SUBMITTED.
- D. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO:
- SEE THAT ALL SUBMITTALS ARE IN PROPER ORDER.
  - INSURE THAT ALL EQUIPMENT WILL FIT IN THE SPACE PROVIDED.
  - ASSURE THAT ALL DEVIATION FROM DRAWINGS AND SPECIFICATION ARE SPECIFICALLY NOTED AND CALLED TO THE ATTENTION OF THE ENGINEER/ARCHITECT/CONTRACTING OFFICER IN THE SUBMITTALS. FAILURE TO COMPLY WILL VOID APPROVAL AUTOMATICALLY.
  - DEVIATION, DISCREPANCIES, AND CONFLICTS BETWEEN THE SUBMITTALS AND THE CONTRACT DOCUMENTS DISCOVERED PRIOR TO OR AFTER THE REVIEW PROCESS SHALL NOT RELIEVE THE CONTRACTOR OF THIS RESPONSIBILITY TO COMPLY WITH THE CONTRACT DOCUMENTS.

E. ELECTRONIC SUBMISSION REQUIREMENTS:

1. SHOP DRAWINGS AND PRODUCT DATA:
- SUBMIT ALL EQUIPMENT AND PRODUCT DATA FOR WORK OF DIVISION 15 TOGETHER IN A GROUP IN A SINGLE PDF FORMAT FILE, WITH EACH ITEM FILED BEHIND A COVER SHEET, AND LABELED WITH ITS RESPECTIVE SPECIATION SECTION NUMBER, ARTICLE AND PARAGRAPH, AND MARK IF APPLICABLE.
  - INCLUDE A COMPLETE INDEX IN THE ORIGINAL SUBMITTAL. INDICATE BOTH ORIGINAL ITEMS SUBMITTED AND NOTE STRAGGLERS THAT WILL BE SUBMITTED AT A LATER DATE TO AVOID DELAY IN SUBMITTING.
  - ADDITIONAL PRODUCT DATA SUBMITTED AFTER RETURN OF THE ORIGINAL FILE SHALL INCLUDE A COVER SHEET SIMILAR TO THAT ORIGINALLY SUBMITTED. UPON RECEIPT OF THE RETURN SUBMITAL, INSERT THEM IN THE PREVIOUSLY SUBMITTED ELECTRONIC FILE.
  - SUBMISSION OF OVERALL LINE OR GENERAL CATALOG DATA WILL NOT BE ACCEPTED, SUBMITTALS MUST BE TAILORED TO SPECIFIC MODEL BEING SUBMITTED ON.
  - INDICATION OF UNIT, MODEL, FEATURES, ETC BEING SUBMITTED MUST BE MARKED BY BOLD ARROW, BOLD CIRCLE OR OTHER CLEAR MEANS THAT WILL REPRODUCE IN BLACK AND WHITE. USE OF HIGHLIGHTS, COLORED TEXT OR OTHER COLORED INDICATORS CANNOT BE USED.
  - ELECTRONIC SUBMISSIONS REVIEW AND COMMENT WILL BE IN ELECTRONIC PDF FORMAT ONLY. SUBMISSION IN AN ELECTRONIC FORMAT WILL BE CONSIDERED ACCEPTANCE OF THIS REVIEW PROCESS AND FORMAT.

g. REFER TO DIVISION 1 FOR NUMBER OF SHOP DRAWING COPIES TO BE SUBMITTED.

1.7 START-UP:

- A. COORDINATE SCHEDULE FOR START-UP OF VARIOUS EQUIPMENT AND SYSTEMS.
- B. NOTIFY OWNER'S REPRESENTATIVE SEVEN DAYS PRIOR TO START-UP OF EACH ITEM.
- C. VERIFY THAT EACH PIECE OF EQUIPMENT OF SYSTEM HAS BEEN CHECKED PRIOR TO START-UP 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 COMPLETED AND TESTED.
- F. EXECUTE START-UP UNDER SUPERVISION OF RESPONSIBLE MANUFACTURER'S REPRESENTATIVE OR CONTRACTOR'S PERSONNEL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- 1.8 FEES, PERMITS AND INSPECTIONS:THE CONTRACTOR IS RESPONSIBLE TO APPLY FOR AND OBTAIN ALL NECESSARY PERMITS, FEES AND INSPECTIONS REQUIRED BY ANY PUBLIC AUTHORITY HAVING JURISDICTION. REFER TO GENERAL CONDITIONS FOR ADDITIONAL INFORMATION.

1.9 DEFINITIONS

- A. 'FURNISH: MEANS TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION AND SIMILAR OPERATIONS.
- B. 'INSTALL': DESCRIBES OPERATIONS AT PROJECT SITE INCLUDING ACTUAL UNLOADING, TEMPORARY STORAGE, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING AND SIMILAR OPERATIONS.
- C. 'PROVIDE': MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE.

PART 2 – PRODUCTS

2.1 MATERIAL:

- A. ALL MATERIALS AND PRODUCTS USED FOR CONSTRUCTION SHALL BE NEW, OF THE BEST GRADE, AND LATEST PRODUCTS AS LISTED IN PRINTED CATALOG DATA. ALL ARTICLES OF A KIND SHALL BE THE STANDARD PRODUCT OF A SINGLE MANUFACTURER. TRADE NAMES AND MANUFACTURERS NAMES DENOTE A CHARACTER AND QUALITY OF EQUIPMENT DESIRED AND SHALL NO BE CONSTRUED AS LIMITING COMPETITION.
- B. ASBESTOS: DO NOT USE PRODUCTS MADE OF OR CONTAINING ASBESTOS.

2.2 QUALITY ASSURANCE

- A. REFER TO SECTION 01640 MATERIAL AND EQUIPMENT FOR INFORMATION REGARDING AVAILABLE ALTERNATIVES TO MATERIALS AND EQUIPMENT SPECIFIED HEREIN. PRODUCT LISTINGS ARE FOR INFORMATIONAL PURPOSES ONLY AND ESTABLISH A GENERAL STANDARD OF QUALITY.
- B. PROVIDE PRODUCTS WHICH ARE COMPATIBLE WITH OTHER PORTIONS OF THE WORK AND PROVIDE PRODUCTS WITH THE PROPER AND CORRECT POWER AND FUEL BURNER CHARACTERISTICS AND SIMILAR ADAPTATIONS FOR THE PROJECT.

2.3 INSPECTION:

- A. ALL WORK AND MATERIALS ARE SUBJECT TO FIELD OBSERVATION AT ANY AND ALL TIMES BY THE OWNER'S REPRESENTATIVE.
- B. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE A MINIMUM OF TWO DAYS PRIOR TO TESTING ANY PIPING SYSTEM WHICH MUST BE WITNESSED AND ACCEPTED BEFORE IT IS COVERED UP OR ENCLOSED.
- C. IF AN OBSERVER FINDS ANY MATERIAL OR WORK NOT CONFORMING TO THESE SPECIFICATIONS, WITHIN THREE DAYS AFTER BEING NOTIFIED, REMOVE THE MATERIALS FROM THE PREMISES AND REPLACE WITH APPROVED MATERIALS. IF THE MATERIAL HAS BEEN INSTALLED, THE ENTIRE EXPENSE OF REMOVING AND REPLACING SHALL BE BORNE OF THE CONTRACTOR.

PART 3 – EXECUTION

3.1 EQUIPMENT PROTECTION

- A. KEEP PIPE, DUCTWORK AND CONDUIT OPENINGS CLOSED BY MEANS OF PLUGS OR CAPS TO PREVENT THE ENTRANCE OF FOREIGN MATTER. PROTECT PIPING, CONDUIT, DUCTWORK, FIXTURES, EQUIPMENT AND APPARATUS AGAINST DIRTY WATER, CHEMICAL OR MECHANICAL DAMAGE BOTH BEFORE AND AFTER INSTALLATION. RESTORE DAMAGED OR CONTAMINATED FIXTURES, EQUIPMENT OR APPARATUS TO ORIGINAL CONDITIONS OR REPLACE AT NO COST TO THE OWNER.
- B. PROTECT BRIGHT FINISHED SHAFTS, BEARING HOUSINGS, AND SIMILAR ITEMS UNTIL IN SERVICE. NO RUST WILL BE PERMITTED.
- C. COVER OR OTHERWISE SUITABLY PROTECT EQUIPMENT AND MATERIALS STORED ON THE JOB SITE.

3.2 CLEANING

- A. GENERAL: CLEAN MECHANICAL AND PLUMBING EQUIPMENT, FIXTURES, PIPING AND DUCTWORK OF STAMPINGS AND MARKINGS (EXCEPT THOSE REQUIRED BY CODES), IRON CUTTINGS, AND OTHER REFUSE.
- B. PAINTED SURFACES: CLEAN SCRATCHED OR MARRED PAINTED SURFACES OF RUST OR OTHER FOREIGN MATER AND PAINT WITH MATCHING COLOR INDUSTRIAL ENAMEL, EXCEPT AS OTHERWISE NOTED.
- C. BEFORE OPERATING ANY EQUIPMENT OR SYSTEMS, MAKE THOROUGH CHECK TO DETERMINE THAT SYSTEMS HAVE BEEN FLUSHED AND CLEANED AS REQUIRED AND EQUIPMENT HAS BEEN PROPERLY INSTALLED, LUBRICATED AND SERVICED. CHECK FACTORY INSTRUCTIONS TO SEE THAT INSTALLATIONS HAVE BEEN MADE ACCORDINGLY AND THAT RECOMMENDED LUBRICANTS HAVE BEEN USED.
- D. USE PARTICULAR CARE IN LUBRICATING BEARINGS TO AVOID DAMAGE BY OVER-LUBRICATION AND BLOWING OUT SEALS. CHECK EQUIPMENT FOR DAMAGE THAT MAY HAVE OCCURRED DURING SHIPMENT, AFTER DELIVERY OR DURING INSTALLATION. REPAIR DAMAGED EQUIPMENT AS APPROVED OR REPLACE WITH NEW EQUIPMENT.

3.3 LAYOUT AND COORDINATION

- A. SITE EXAMINATION: BEFORE STARTING WORK, CAREFULLY EXAMINE SITE AND ALL CONTRACT DRAWINGS SO AS TO BECOME THOROUGHLY FAMILIAR WITH CONDITIONS GOVERNING WORK ON THIS PROJECT. VERIFY ALL INDICATED ELEVATIONS, BUILDING MEASUREMENTS, ROUGHING-IN DIMENSIONS AND EQUIPMENT LOCATIONS BEFORE PROCEEDING WITH ANY OF THE WORK.
- B. THE EXISTENCE OF ANY WIRES, CONDUITS, PIPES, DUCTS OR OTHER SERVICE FACILITIES ARE SHOWN IN A GENERAL WAY ONLY. IT WILL BE THE DUTY OF THE CONTRACTOR TO VISIT THE SITE AND MAKE EXACT DETERMINATION OF THE EXISTENCE OF ANY SUCH FACILITIES PRIOR TO SUBMITTING A BID. IT IS UNDERSTOOD THAT THE CONTRACTOR WILL BE RESPONSIBLE FOR MAKING THE EXACT DETERMINATION OF THE LOCATION AND CONDITION OF THESE FACILITIES.
- C. THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS IS TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN MAY BE PRESENT.
- D. SLEEVES, INSERTS, CAST-IN-PLACE WORK: PROVIDE SLEEVES, INSERTS, ANCHORING DEVICES, CAST-IN-PLACE WORK, ETC. WHICH MUST BE SET IN CONCRETE SEQUENCED AT THE PROPER TIME FOR THE PROJECT SCHEDULE.
- E. COORDINATION:
- WHERE THE WORK MUST BE SEQUENCED AND POSITIONED WITH PRECISION IN ORDER TO FIT INTO THE AVAILABLE SPACE, PREPARE ACCURATE SCALE SHOP DRAWINGS SHOWING THE ACTUAL PHYSICAL DIMENSIONS REQUIRED FOR THE INSTALLATION AND SUBMIT PRIOR TO PURCHASE-FABRICATION-INSTALLATION OF ANY OF THE ELEMENTS INVOLVED IN THE COORDINATION.
  - COOPERATE WITH OTHER TRADES IN FURNISHING MATERIAL AND INFORMATION FOR SLEEVES, BUCKS, CHASES, MOUNTINGS, BACKING, FOUNDATIONS AND WIRING REQUIRED FOR INSTALLATION OF MECHANICAL ITEMS.
  - COORDINATE ALL WORK WITH OTHER TRADES IN ADVANCE WHERE INTERFACING OF THE MECHANICAL WORK AND OTHER WORK ARE REQUIRED TO BE CONNECTED TOGETHER. PROVIDE ALL MATERIALS AND EQUIPMENT TO MAKE THOSE CONNECTIONS. SUBMIT SHOP DRAWINGS SHOWING REQUIRED CONNECTIONS WHERE SPECIAL CONDITIONS EXIST.
- F. DISCREPANCIES: REPORT IMMEDIATELY ANY ERROR, CONFLICT OR DISCREPANCY IN PLANS, SPECIFICATIONS AND/OR EXISTING CONDITIONS. DO NOT PROCEED WITH ANY QUESTIONABLE ITEMS OF WORK UNTIL CLARIFICATION OF SAME HAS BEEN MADE. SHOULD REARRANGEMENT OR RE-ROUTING OF DUCTS OR PIPING BE NECESSARY, PROVIDE FOR APPROVAL THE SIMPLEST LAYOUT POSSIBLE FOR THAT PARTICULAR PORTION OF THE WORK.

3.4 TEMPORARY FACILITIES AND CONTROLS

- A. COMPLY WITH SECTION 01500 REQUIREMENTS.
- B. PERMANENT MECHANICAL SYSTEMS' EQUIPMENT UTILIZED FOR TEMPORARY HEATING, VENTILATING AND COOLING SHALL BE STARTED WITH ALL CONTROLS AND SAFETIES INSTALLED AND OPERATIONAL. START-UP SHALL BE DONE BY A FACTORY APPROVED MECHANIC ONLY.
- C. OWNER'S WARRANTIES SHALL NOT BE ABRIDGED BY CONTRACTOR'S USE OF THE PERMANENT SYSTEMS' EQUIPMENT PRIOR TO FINAL ACCEPTANCE. WARRANTY PERIOD SHALL BEGIN AT FINAL COMPLETION.

3.5 MECHANICAL WORK CLOSEOUT

- A. GENERAL: REFER TO THE DIVISION 1 SECTIONS FOR GENERAL CLOSEOUT REQUIREMENTS. CALIBRATE ALL EQUIPMENT REQUIRING SAME.
- B. RECORD DRAWINGS: SUBMIT RECORD SET OF DRAWINGS REQUIRED IN SECTION 01340, SUBMITTALS AND AS PREVIOUSLY SPECIFIED IN THIS SECTION.
- C. CLOSEOUT EQUIPMENT/SYSTEMS OPERATIONS: SEQUENCE OPERATIONS PROPERLY SO THAT WORK OF PROJECT WILL NOT BE DAMAGED OR ENDANGERED. COORDINATE WITH SEASONAL REQUIREMENTS. OPERATE EACH ITEM OF EQUIPMENT AND EACH SYSTEM IN A TEST RUN OF APPROPRIATE DURATION WITH THE ARCHITECT PRESENT, AND WITH THE OWNER'S OPERATING PERSONNEL PRESENT, TO DEMONSTRATE SUSTAINED, SATISFACTORY PERFORMANCE. ADJUST AND CORRECT OPERATIONS AS REQUIRED FOR PROPER PERFORMANCE. CLEAN AND LUBRICATE EACH SYSTEM, AND REPLACE DIRTY FILTERS, EXCESSIVELY WORN PARTS AND SIMILAR EXPENDABLE ITEMS OF THE WORK.
- D. OPERATION AND INSTRUCTION: PROVIDE 24 HOURS OF ON-SITE TRAINING TO OWNER'S PERSONNEL ON ALL MECHANICAL SYSTEMS AND EQUIPMENT. TRAINING SHALL INCLUDE MAINTENANCE, LUBRICATION, TROUBLESHOOTING AND REPAIR. CONTRACTOR SHALL PROVIDE NECESSARY WRITTEN MANUALS AND TRAINING AIDS EXPLAINING OPERATIONAL DIAGRAMS, EMERGENCY AND ALARM PROVISIONS, SEQUENCING REQUIREMENTS, SEASONAL PROVISIONS, SECURITY, SAFETY AND SIMILAR FEATURES OF THE INSTALLED SYSTEM. SIX (6) COPIES OF WRITTEN MANUALS SHALL BE LEFT WITH OWNER AT END OF TRAINING.

SECTION 15050 – BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.1 SECTION INCLUDES:

- A. ITEMS COMMON TO MORE THAN ONE SECTION OF DIVISION 15 AND GENERAL CONSTRUCTION PROCEDURES AND PRODUCTS. WORK DESCRIBED IN THIS SECTION APPLIES TO ALL SECTIONS OF DIVISION 15.

1.2 STORAGE AND HANDLING

- A. DELIVER MATERIALS TO THE PROJECT SITE WITH MANUFACTURER'S LABELS INTACT AND LEGIBLE. HANDLE MATERIALS WITH CARE TO AVOID DAMAGE. STORE MATERIALS INSIDE PROTECTED FROM WEATHER, DIRT AND CONSTRUCTION DUST. WHERE NECESSARY TO STORE OUTSIDE, ELEVATE WELL ABOVE GRADE AND ENCLOSE WITH DURABLE, WATERPROOF WRAPPING. LABEL EQUIPMENT AS SOON AS IT ARRIVES AT JOB SITE.

1.3 SUBMITTALS

- A. SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 15010 AND DIVISION 1.
- B. PROVIDE SUBMITTALS FOR:
- MOTORS.
  - STARTERS.
  - ALARM PANELS.
  - PIPE SLEEVES
  - ESCUTCHEONS.
  - PIPING AND EQUIPMENT IDENTIFICATION.
  - VALVE SCHEDULE.
  - VARIABLE FREQUENCY DRIVES

PART 2 – PRODUCTS

2.1 QUALITY ASSURANCE

- A. REFER TO SECTION 01640 MATERIAL AND EQUIPMENT FOR INFORMATION REGARDING AVAILABLE ALTERNATIVES TO MATERIALS AND EQUIPMENT SPECIFIED HEREIN. PRODUCT LISTINGS ARE FOR INFORMATIONAL PURPOSES ONLY AND ESTABLISH A GENERAL STANDARD OF QUALITY.
- B. PROVIDE PRODUCTS WHICH ARE COMPATIBLE WITH OTHER PORTIONS OF THE WORK AND PROVIDE PRODUCTS WITH THE PROPER AND CORRECT POWER AND FUEL BURNER CHARACTERISTICS AND SIMILAR ADAPTATIONS FOR THE PROJECT.

2.2 MATERIALS

- A. ALL MATERIALS AND PRODUCTS USED FOR CONSTRUCTION SHALL BE NEW, OF THE BEST GRADE, AND THE LATEST PRODUCTS AS LISTED IN PRINTED CATALOG DATA.
- B. ALL ARTICLES OF A KIND SHALL BE THE STANDARD PRODUCT OF A SINGLE MANUFACTURER.
- C. PROVIDE PRODUCTS WHICH ARE COMPATIBLE WITH OTHER PORTIONS OF THE WORK AND PRODUCTS WHICH HAVE THE PROPER ELECTRICAL POWER AND FUEL-BURNING CHARACTERISTICS FOR THIS PROJECT.
- D. TRADE NAMES AND MANUFACTURERS NAMES DENOTE THE CHARACTER AND QUALITY OF EQUIPMENT DESIRED AND SHALL NOT BE CONSTRUED AS LIMITING COMPETITION.

2.3 ELECTRIC MOTORS

- A. ENCLOSURE TYPE: OPEN DRIP-PROOF FOR NORMAL CONCEALED INDOOR USE, GUARDED WHERE EXPOSED TO EMPLOYEES OR OCCUPANTS. TYPE II FOR OUTDOOR USE, EXCEPT WEATHER-PROTECTED TYPE I WHERE ADEQUATELY HOUSED.
- B. BEARINGS: BALL OR ROLLER BEARINGS, AND DESIGN FOR THRUST WHERE APPLICABLE; PERMANENT OR PRESSURE LUBRICATED ANTI-FRICTION. SLEEVE-TYPE BEARINGS PERMITTED ONLY WHERE INDICATED FOR LIGHT-DUTY FRACTIONAL HORSEPOWER MOTORS.
- C. CONSTRUCTION: GENERAL PURPOSE, CONTINUOUS DUTY; NEMA DESIGN 'B', EXCEPT 'C' FOR HIGH STARTING TORQUE APPLICATIONS.
- D. FRAMES: FOR SINGLE PHASE MOTOR SIZES NEMA NO. 48, EXCEPT 56 FOR HEAVY-DUTY APPLICATIONS. NEMA 'T' FRAMES FOR 1 HORSEPOWER AND LARGER POLYPHASE MOTORS.
- E. PHASES AND CURRENT: 1/3 HORSEPOWER AND SMALLER CAPACITOR-START SINGLE-PHASE; ¼ HORSEPOWER AND LARGER, SQUIRREL-CAGE INDUCTION POLYPHASE. COORDINATE WITH ACTUAL CURRENT CHARACTERISTICS; SPECIFIED IN DIVISION 16 AND DO NOT USE 230/480 VOLTAGE MOTORS ON 208 VOLTAGE POWER OR VISE VERSA.
- F. SERVICE FACTOR: 1.35 FOR SINGLE-PHASE; 1.15 FOR POLYPHASE.
- G. OVERLOAD PROTECTION: BUILT-IN THERMAL WITH INTERNAL SENSING DEVICE FOR STOPPING MOTOR, AND FOR SIGNALING WHERE INDICATED ON SINGLE PHASE MOTORS.
- H. SPEED: NOT FASTER THAN SYNCHRONOUS SPEEDS OF 1800 RPM EXCEPT WHERE OTHERWISE INDICATED.
- I. TEMPERATURE RATING: CLASS B INSULATION, EXCEPT WHERE OTHERWISE INDICATED OR REQUIRED FOR SERVICE INDICATED.
- J. STARTING CAPABILITY: AS REQUIRED FOR SERVICE INDICATED, BUT NOT LESS THAN 5 STARTS PER HOUR.
- K. EFFICIENCY: THE MANUFACTURER'S HIGHEST EFFICIENCY MOTORS TESTED UNDER PROCEDURES RECOMMENDED BY NEMA (IEEE STANDARD 112, TEST METHOD B). MINIMUM 84% EFFICIENCY AT 3 HP INCREASING TO 90% ABOVE 15 HP. SUBMIT MANUFACTURER'S DATA IF MOTOR NAMEPLATE DOES NOT INDICATE MINIMUM EFFICIENCY.
- L. MANUFACTURERS: CENTURY, GENERAL ELECTRIC, LINCOLN, LOUIS ALLIS, BALDOR, WAGNER, WESTINGHOUSE OR ACCEPTED SUBSTITUTE. WHERE SELECTION OF MOTOR MANUFACTURER IS WITHIN CONTRACTOR'S CONTROL (INDEPENDENT OF MECHANICAL EQUIPMENT SELECTION), PROVIDE MOTORS PRODUCED BY A SINGLE MANUFACTURER.

2.4 STARTERS AND SWITCHES

- A. GENERAL: PROVIDE EACH MOTOR WITH STARTER OR SWITCH AS APPROVED AND RECOMMENDED BY MANUFACTURER OF MOTOR OR EQUIPMENT OF WHICH MOTOR IS A PART.
- B. MAGNETIC STARTERS: PROVIDE FOR ¼ HORSEPOWER AND LARGER MOTORS, AND FOR SMALLER MOTORS ON AUTOMATIC CONTROL OR WITH INTERLOCK SWITCH. INCLUDE PILOT LIGHTS, RESET, TRIP-FREE RELAY ON EACH PHASE, HAND-OFF-AUTO SWITCH IN COVER, AND DEVICES FOR COORDINATION WITH CONTROL SYSTEM (INCLUDING TRANSFORMER FOR CONTROL CIRCUIT, VERIFY HOLDING COIL VOLTAGE REQUIREMENTS WITH CONTROL SYSTEM DESIGN). PROVIDE AUTOMATIC AMBIENT TEMPERATURE COMPENSATION FOR STARTER HEATERS.
- C. MANUAL SWITCHES: PROVIDE ON MOTORS 1/3 HORSEPOWER AND SMALLER EXCEPT WHERE AUTOMATIC CONTROL OR INTERLOCK IS INDICATED. INCLUDE PILOT LIGHT. PROVIDE OVERLOAD PROTECTION WHERE NOT PROTECTED BY PANEL BOARD CIRCUIT BREAKER OR FUSED DISCONNECT SWITCH.
- D. STARTER CHARACTERISTICS: TYPE I GENERAL PURPOSE ENCLOSURE WITH PADLOCK EARS AND MOUNTING SUPPORTS. STARTER TYPE AND SIZE AS RECOMMENDED BY MOTOR MANUFACTURER.
- E. MANUFACTURERS: GENERAL ELECTRIC, ITE, ALLEN BRADLEY, CUTLER-HAMMER, SQUARE D OR ACCEPTED SUBSTITUTE.

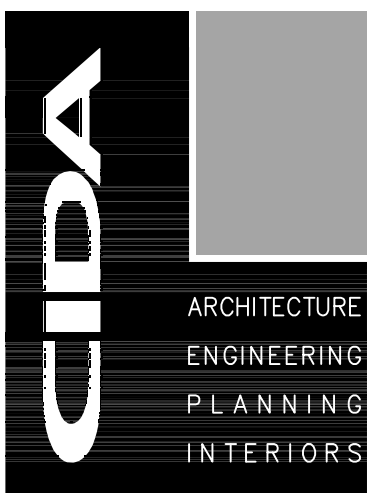
2.5 ELECTRICAL EQUIPMENT

- A. EQUIPMENT WIRING: INTERCONNECTING WIRING WITHIN OR ON A PIECE OF MECHANICAL EQUIPMENT SHALL BE PROVIDED WITH THE EQUIPMENT UNLESS REQUIRED OTHERWISE. PROVIDE ALL NECESSARY FIELD WIRING AND DEVICES FROM THE POINT OF CONNECTION INDICATED ON THE ELECTRICAL DRAWINGS TO EACH EQUIPMENT ITEM.
- B. CONTROL WIRING: ALL CONTROL WIRING FOR MECHANICAL EQUIPMENT SHALL BE PROVIDED UNDER SECTION 15900, CONTROLS AND INSTRUMENTATION.



RECAP: 06-152-9705

ISSUED DATE 1 03.23.2020 PRELIMINARY DRAWING SET 2 04.21.2020 PERMIT SET



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PLUMBING SPECIFICATION

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- C. CODES: ALL ELECTRICAL EQUIPMENT AND PRODUCTS SHALL BEAR THE U.L. AND/OR C.S.A. LABEL AS REQUIRED BY GOVERNING CODES AND ORDINANCES. REFER TO PARAGRAPH 1.3, QUALITY ASSURANCE FOR DEFINITION OF TESTING AGENCY CERTIFICATION REQUIREMENTS.
- 2.6 DRIVES
- A. GENERAL: 1" V SECTION BELT DRIVES, MULTIPLE AS REQUIRED, SIZED ON 1.5 TIMES INSTALLED MOTOR HORSEPOWER. PROVIDE VARIABLE PITCH MOTOR SHEAVES ON ALL ONE OR TWO BELT DRIVES AND STANDARD SLIDE RAILS OR APPROVED MEANS OF ADJUSTMENT FOR EACH MOTOR WITH BELT DRIVE. USE STANDARD SECTION BELTS AND NO SHEAVE SMALLER THAN CATALOGED INDUSTRY STANDARD; PROVIDE COUNTERSUNK CENTER ON SHAFT ENDS TO RECEIVE SPEED COUNTER TIP.
- B. MANUFACTURERS: DAYTON, GATES, BROWNING, OR ACCEPTED SUBSTITUTE.
- 2.7 MACHINERY GUARDS
- A. FURNISH GUARDS FOR PROTECTION ON ALL ROTATING AND MOVING PARTS OF EQUIPMENT. PROVIDE GUARDS FOR ALL METAL FAN DRIVES AND MOTOR PULLEYS, REGARDLESS OF BEING ENCLOSED IN A METAL CABINET.
- B. DESIGN GUARDS SO AS NOT TO RESTRICT AIR FLOW AT FAN INLETS RESULTING IN REDUCED CAPACITY.
- C. PROVIDE 2-1/2 INCHES DIAMETER ACCESS OPENING HOLES IN GUARDS FOR EASY USE OF TACHOMETERS AT PULLEY CENTERS. GUARDS SHALL BE EASILY REMOVABLE FOR PULLEY ADJUSTMENT OR REMOVAL AND CHANGING OF BELTS.
- D. ALL GUARDS SHALL MEET OSHA REQUIREMENTS INCLUDING BACK PLATES.
- 2.8 ACCESS PANELS
- A. ACCESS PANELS SHALL HAVE SAME FIRE RATING AS SURFACE WHERE MOUNTED.
- B. PROVIDE FLUSH KEY CYLINDER LOCKS ON ALL ACCESS PANELS LESS THAN 8 FEET ABOVE THE FLOOR IN PUBLIC SPACES. TURN KEYS OVER TO OWNER AT PROJECT COMPLETION. SCREWDRIVER LATCHES ON ALL OTHERS.
- C. STEEL, 24" X 24" OR AS REQUIRED. COMPLETE WITH STEEL FRAME, HINGED LOCATING DOOR, AND PRIME COAT FINISH. TYPE TO MATCH BUILDING CONSTRUCTION.
- D. MANUFACTURERS: INRYCO/MILCOOR STYLE DW, K OR M PANELS AS REQUIRED BY CONSTRUCTION. BILCO, POTTER-ROEMER OR ACCEPTED SUBSTITUTE.
- 2.9 PIPE SLEEVES
- A. INTERIOR WALL SLEEVES: 12 GAGE GALVANIZED STEEL, FLUSH WITH WALL ON BOTH SIDES.
- B. INTERIOR FLOOR SLEEVES: 12 GAGE GALVANIZED STEEL AND EXTEND 2-INCHES ABOVE FINISHED FLOOR.
- C. EXTERIOR WALL SLEEVES: CAST IRON, FLUSH WITH WALL ON BOTH SIDES.
- D. ON GRADE FLOOR SLEEVES: SAME AS EXTERIOR WALL SLEEVES.
- 2.10 ESCUTCHEONS
- A. BRASS MATERIAL, CHROME PLATED FINISH. SIZE SUFFICIENT TO COVER ALL PIPE OPENINGS THROUGH WALL, FLOOR OR CEILING. SET SCREW OR SPRING TO SECURE TO PIPE.
- 2.11 UNIONS
- A. STEEL PIPE UNION SHALL BE 150-POUND MALLEABLE IRON, BRASS TO IRON SEAT, GROUND JOINT, BLACK OR GALVANIZED TO MATCH PIPE.
- B. COPPER PIPE UNION SHALL BE 200 PSIG WORKING PRESSURE. BRONZE BODY. SOLDER ENDS.
- C. INSULATING UNIONS SHALL BE 250 PSIG WORKING PRESSURE. PIPE ENDS AND MATERIAL TO MATCH PIPING. ELECTRIC CURRENT BELOW 1% OF GALVANIC CURRENT. GASKET MATERIAL AS RECOMMENDED BY MANUFACTURER. EPCO OR APPROVED.
- 2.12 ROOF FLASHING
- A. USE FLASHING PRODUCTS SPECIFICALLY DESIGNED FOR AND COMPATIBLE WITH METAL ROOFING SYSTEM USED.
- 2.13 MISCELLANEOUS STEEL
- A. PROVIDE STEEL AS REQUIRED FOR ADEQUATE SUPPORT OF ALL MECHANICAL EQUIPMENT, ANGLE OR CHANNEL, I OR H SECTIONS AS REQUIRED BY APPLICATION. PROVIDE SUITABLE BASE PLATES FOR STANDS AND ANCHORS FOR HANGING EQUIPMENT. DRILL SUPPORT HOLES ONLY IN FLANGES OF STRUCTURAL CENTER OF LENGTH AS POSSIBLE. APPLY ON COAT OF BLACK RUST INHIBITIVE ENAMEL PRIMER TO SHOP FABRICATED ITEMS BEFORE DELIVERY TO JOB; OTHER PAINTING AS SPECIFIED HEREIN. PROVIDE SHOP DRAWINGS OF SUPPORTS ESPECIALLY CONSTRUCTED FOR THIS PROJECT. BURNING OF HOLES IS NOT PERMITTED.
- 2.14 PAINTING
- A. APPLY ONE COAT OF BLACK RUSTOLEUM PRIMER TO SHOP FABRICATED ITEMS BEFORE DELIVERY TO JOB. OTHER PAINTING AS SPECIFIED HEREIN.
- 2.15 IDENTIFICATION MARKERS
- A. PIPE MARKERS:
1. ADHESIVE PIPE MARKERS OF WIDTH, LETTER SIZE AND BACKGROUND COLOR CONFORMING TO ANSI A13.1.
  2. ACCEPTABLE MANUFACTURERS: BRADY B350 WITH BANDING TAPE. SEATON, ZESTON, PORTER OR ACCEPTED SUBSTITUTE.
- B. NAMEPLATES:
1. ENGRAVED NAMEPLATES, 1/16 INCHES THICK, LAMINATED 3-PLY PLASTIC, CENTER PLY WHITE, OUTER PLY BLACK, LETTERS FORMED BY EXPOSING CENTER PLY.
  2. SIZE: 3 INCHES BY 5 INCHES NAMEPLATES WITH 1/4-INCH HIGH LETTERS.
  3. MANUFACTURERS: LAMICOID. SEATON, BRADY, ZESTON OR ACCEPTED SUBSTITUTE.
- C. VALVE TAGS:
1. 1-1/2 INCHES DIAMETER, 18-GAUGE POLISHED BRASS TAGS WITH 3/16-INCH CHAIN HOLE AND 1/4 INCH HIGH STAMPED, BLACK-FILLED SERVICE DESIGNATION.
  2. MANUFACTURERS: SEATON STYLE 250-BL, BRADY, ZESTON OR ACCEPTED SUBSTITUTE.
- D. LETTERING AND GRAPHICS:
1. COORDINATE NAMES, ABBREVIATIONS AND OTHER DESIGNATIONS USED IN MECHANICAL IDENTIFICATION WORK WITH DESIGNATIONS SHOWN OR SCHEDULED. PROVIDE NUMBERS, LETTERING AND WORDING AS INDICATED FOR IDENTIFICATION OF MECHANICAL SYSTEMS AND EQUIPMENT.
  2. MULTIPLE SYSTEMS: WHERE MULTIPLE SYSTEMS OF SAME NAME ARE SHOWN PROVIDE IDENTIFICATION WHICH INDICATES INDIVIDUAL EQUIPMENT NUMBER AS WELL AS SERVICE (EXAMPLES: CHILLER (CH) NO. 1, CHILLER (CH) NO. 2, AIR CONDITIONING UNIT NO. 1 (AC) NO. 1, AIR CONDITIONING UNIT (AC) NO. 2.)
- 2.16 VALVE SCHEDULES
- A. SCHEDULES: VALVE SCHEDULE FOR EACH PIPING SYSTEM, TYPEWRITTEN AND REPRODUCED ON 8-1/2 BY 11-INCH PAPER. INDICATE VALVE NUMBER, PIPING SYSTEM, LOCATION OF VALVE (ROOM OR SPACE) AND NORMAL SETTING (OPEN, CLOSED, ETC.). MARK VALVES WHICH ARE INTENDED FOR EMERGENCY SHUTOFF AND SIMILAR USES BY SPECIAL NOTATION. IN ADDITION TO MOUNTED COPIES, FURNISH FIVE (5) EXTRA COPIES FOR MAINTENANCE MANUALS.
- 2.17 CONCRETE FOR MECHANICAL WORK
- A. PROVIDE STRENGTH CLASSES PER UNIFORM BUILDING CODE CHAPTER 19.
- 2.18 VARIABLE-FREQUENCY MOTOR CONTROLLERS
- A. ACCEPTABLE MANUFACTURERS: ALLEN BRADLEY, ROBICON, ABB TRANE, YASAKAWA, SIEMENS EMORSON INDUSTRIAL AUTOMATION, OR APPROVED EQUAL.
- B. GENERAL DESCRIPTION
1. AC MOTOR VARIABLE FREQUENCY CONTROLLER (VFC) SHALL BE OF PULSE WIDTH MODULATED (PWM) INVERTER TYPE. THE VFC SHALL BE DESIGNED TO CONVERT 60 HZ INPUT POWER TO ADJUSTABLE FREQUENCY OUTPUT POWER TO PROVIDE POSITIVE SPEED CONTROL TO STANDARD INDUCTION MOTORS. THE VFC SHALL BE DEDICATED VARIABLE TORQUE DESIGN FOR SPECIFIC USE WITH CENTRIFUGAL LOADS.
  2. PROVIDE COMPLETE SOLID STATE VARIABLE FREQUENCY POWER AND LOGIC UNIT.
  3. FREQUENCY CONTROL SHALL BE STEPLESS THROUGHOUT THE RANGE UNDER VARIABLE TORQUE LOAD ON A CONTINUOUS BASIS. FREQUENCY CONTROLLED BY REMOTE BUILDING ENERGY MANAGEMENT SYSTEMS PROVIDING 4-20MA INPUT SIGNAL TO DRIVE AND REMOTE START/STOP SIGNAL. COORDINATE WITH OTHER WORK OF DIVISION 23.
  4. PROVIDE ADJUSTABLE FREQUENCY CONTROL WITH DIODE BRIDGE/CAPACITY INPUT DESIGNED TO PROVIDE HIGH, CONSTANT POWER FACTOR OF 0.95 REGARDLESS OF LOAD OR SPEED AND ELIMINATE SCR LINE NOISE.
  5. EACH VFD SHALL CONTRIBUTE NO MORE THAN 5 PERCENT TOTAL HARMONIC VOLTAGE DISTORTION AT THE VFD INPUT TERMINALS WHILE OPERATING UNDER FULL-LOAD CONDITIONS. IF PROPOSED VFD EQUIPMENT IS ANTICIPATED TO EXCEED THESE LIMITS, MULTI-PULSE CONVERTERS AND/OR HARMONIC FILTERING DEVICES SHALL BE PROVIDED.
  6. EQUIPMENT SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH APPLICABLE NEMA AND IEEE RECOMMENDATIONS AND BE DESIGNED FOR INSTALLATION IN ACCORDANCE WITH NEC. EQUIPMENT SHALL HAVE UL AND/OR CSA APPROVAL.
  7. CONTROL SHALL BE SUITABLE FOR OPERATION IN AMBIENT TEMPERATURE OF 0 TO 40°C.
- C. EVERY VFD SHALL BE FACTORY TESTED WITH AN AC INDUCTION MOTOR 100 PERCENT LOADED AND TEMPERATURE CYCLES WITHIN AN ENVIRONMENTAL CHAMBER AT 104°F.

- A. SELF PROTECTION AND RELIABILITY FEATURES:
1. ADJUSTABLE CURRENT LIMIT FROM 60 TO 110 PERCENT OF DRIVE RATING
  2. ADJUSTABLE INSTANTANEOUS OVER CURRENT TRIP.
  3. UNDER VOLTAGE TRIP.
  4. OVER TEMPERATURE TRIP.
  5. SHORT CIRCUIT PROTECTION PHASE TO PHASE AND PHASE TO GROUND FAULTS PHASE ROTATION INSENSITIVE.
  6. MOMENTARY POWER LOSS, MORE THAN 17 MILLISECONDS.
  7. TRANSIENT PROTECTION AGAINST ALL NORMAL TRANSIENTS AND SURGES IN INCOMING POWER LINE.
  8. ORDERLY SHUTDOWN IN EVENT OF ANY ABOVE CONDITIONS, DRIVE SHALL BE DESIGNED TO SHUT DOWN SAFELY WITHOUT COMPONENT FAILURE.
  9. PROVIDE VISUAL INDICATION AND MANUAL RESET.
- D. STANDARD FEATURES
1. DRIVE LOGIC SHALL BE MICROPROCESSOR BASED. CONTROL LOGIC SHALL BE ISOLATED FROM POWER CIRCUITRY.
  2. STANDALONE OPERATION TO FACILITATE STARTUP AND TROUBLESHOOTING PROCEDURES.
  3. VFD SHALL HAVE A LOCKABLE CIRCUIT BREAKER DISCONNECT AND BE UL 508C LISTED FOR USE ON DISTRIBUTION SYSTEMS WITH 22,000 AIC.
  4. DOOR INTERLOCK PROTECTION WHICH SHALL BE DEFEATABLE BY QUALIFIED PERSONNEL TO TROUBLESHOOT DURING OPERATION AS REQUIRED.
  5. INPUT POWER 460V 60HZ, 3-PHASE OUTPUT VOLTAGES SHALL BE EQUAL TO APPLIED INPUT VOLTAGE.
  6. ISOLATED SIGNAL INPUTS.
  7. FREQUENCY STABILITY: OUTPUT FREQUENCY SHALL BE HELD TO +0.1 PERCENT OF MAXIMUM FREQUENCY REGARDLESS OF LOAD, +10 PERCENT INPUT VOLTAGE CHANGE OR TEMPERATURE CHANGES WITHIN AMBIENT SPECIFICATION.
  8. BUILT-IN DIGITAL DISPLAY LOCATED IN PANELFACE SHALL INDICATE OUTPUT FREQUENCY, VOLTAGE AND CURRENT AND SHALL PROVIDE INDICATION OF OVER CURRENT, OVER VOLTAGE, CURRENT LIMIT, GROUND FAULT, OVER TEMPERATURE, INPUT POWER ON, MINIMUM OR MAXIMUM SPEED ADJUSTMENT, POWER ON, AND FAULT CONDITION.
  9. START/STOP CONTROL: CONTROLLED DECELERATED STOP.
  10. PRIMARY AND SECONDARY FUSED FOR A CONTROL CIRCUIT TRANSFORMER.
  11. MINIMUM AND MAXIMUM SPEED CONTROL.
  12. ADJUSTABLE ACCEL/DECEL: INDEPENDENTLY ADJUSTABLE 10-100 SECOND.
  13. HANDS-OFF AUTO SWITCHES.
  14. PROGRAMMABLE AUTO RESTART AFTER POWER OUTAGE.
  15. FUSED DISCONNECTS SHALL INCLUDE AUXILIARY CONTACTS TO ISOLATE CONTROL CIRCUIT WHEN DISCONNECT IS IN "OFF" POSITION.
  16. REMOTE CONTACTS FOR FAULT, AND ON/OFF STATUS.
  17. ADJUSTABLE MOTOR OUTPUT VOLTAGE.
  18. ANALOG OUTPUT VOLTAGE OF 0-10 VDC, 4-20MA PROPORTIONAL TO CONTROL OUTPUT FREQUENCY.
  19. RS232 COMMUNICATIONS PORT, AND PROGRAMMING SOFTWARE CAPABILITY.
- E. ADDITIONAL FEATURES
1. NEMA 1 ENCLOSURE SHALL ISOLATE EACH MOTOR STARTER AND CONTROL SECTION WITH ITS ASSOCIATED DISCONNECT SWITCH.
  2. MANUAL SPEED CONTROL FOR EACH MOTOR.
  3. MANUAL BYPASS SHALL PROVIDE ABILITY TO SERVICE CONTROL WHILE MOTOR IS OPERATIONAL.
  4. PROVIDE RADIO FREQUENCY AND ELECTROMAGNETIC INTERFERENCE NOISE SUPPRESSION NETWORK TO LIMIT RADIO FREQUENCY AND ELECTROMAGNETIC INTERFERENCE.
  5. PROVIDE ISOLATED ANALOG OUTPUT SIGNALS FOR VOLTS, AMPS, AND FREQUENCY, FROM EACH VFD FOR CONNECTION TO THE BUILDING ENERGY MANAGEMENT SYSTEM.
  6. PROVIDE LINE (INPUT) REACTORS.
  7. PROVIDE OUTPUT FILTERS FOR ALL VFD'S LOCATED MORE THAN 150 CONDUCTOR FEET FROM THE MOTOR THEY SERVE.
  8. VFD SHALL BE DESIGNED TO CATCH A SPINNING LOAD IN FORWARD AND REVERSE DIRECTION.
  9. HARMONIC CALCULATIONS SHALL BE PERFORMED ON A MANUFACTURER-SUPPLIED HARMONIC ANALYSIS PROGRAM FOR CONFORMANCE WITH IEEE 519.
- 2.19 PART 3 - EXECUTION
- 3.1 ACCESS PANELS
- A. FURNISH AND INSTALL ACCESS PANELS REQUIRED FOR MECHANICAL WORK. ACCESS PANELS SHALL HAVE SAME FIRE RATINGS AS SURFACE WHERE MOUNTED. FURNISH PANELS OF ADEQUATE SIZE FOR VALVES AND EQUIPMENT REQUIRING SERVICE AND INSTALLED ABOVE CEILINGS, BEHIND WALLS OR IN FURRING, COMPLETE WITH CORRECT FRAME FOR TYPE OF BUILDING CONSTRUCTION INVOLVED. EXACT SIZE, NUMBER AND LOCATION OF ACCESS PANELS ARE NOT NECESSARILY SHOWN. USE NO PANEL SMALLER THAN 12 INCHES BY 12 INCHES FOR SIMPLE MANUAL ACCESS OR SMALLER THAN 18 INCHES BY 20 INCHES WHERE PERSONNEL MUST PASS THROUGH. PAINT WITH COLOR AND FINISH TO MATCH SURROUNDING ARCHITECTURAL FEATURES, WHERE EXPOSED.
- 3.2 PIPE SLEEVES
- A. SLEEVES: LARGE ENOUGH IN DIAMETER TO PROVIDE 1/4-INCH CLEARANCE AROUND PIPES OR INSULATION. CAULK WITH WATERTIGHT RATED, UL LISTED FOAM-IN-PLACE BARRIER.
- B. LAYOUT: LAY OUT WORK IN ADVANCE OF POURING OF SLABS OR CONSTRUCTION OF WALL, AND FURNISH AND SET INSERTS AND SLEEVES NECESSARY TO COMPLETE THE WORK.
- C. COORDINATION: CUTTING OR PATCHING REQUIRED AS A RESULT OF LACK OF COORDINATION OF THIS OPERATION SHALL BE AT NO CHANGE IN CONTRACT AMOUNT.
- 3.3 FLOOR, WALL AND CEILING ESCUTCHEONS
- A. INSTALL ON PIPING PASSING THROUGH FINISHED WALLS, FLOORS, CEILINGS, PARTITIONS AND PLASTER FURRINGS. ESCUTCHEONS SHALL COMPLETELY COVER OPENING AROUND PIPE.
- B. SECURE WALL AND CEILING ESCUTCHEONS TO PIPE OR STRUCTURE.
- C. ESCUTCHEONS SHALL NOT PENETRATE INSULATION VAPOR BARRIERS.
- D. ESCUTCHEONS NOT REQUIRED IN MECHANICAL ROOMS OR UNFINISHED SPACES.
- 3.4 MECHANICAL EQUIPMENT WIRING
- A. PROVIDE ALL MECHANICAL EQUIPMENT MOTORS, AUTOMATIC TEMPERATURE, LIMIT, FLOAT AND SIMILAR CONTROL DEVICES REQUIRED, WITH WIRING COMPLETE FROM POWER SOURCE INDICATED ON ELECTRICAL DRAWINGS.
- B. PROVIDE PROPERLY RATED MOTOR OVERLOAD AND UNDER VOLTAGE PROTECTION AND ALL MANUAL OR AUTOMATIC MOTOR OPERATING DEVICES FOR ALL MECHANICAL EQUIPMENT.
- C. EQUIPMENT AND SYSTEMS SHOWN ON THE DRAWINGS AND/OR SPECIFIED, ARE BASED UPON REQUIREMENTS OF SPECIFIC MANUFACTURERS WHICH ARE INTENDED AS SOMEWHAT TYPICAL OF SEVERAL MAKES WHICH MAY BE APPROVED. PROVIDE ALL FIELD WIRING AND/OR DEVICES NECESSARY FOR A COMPLETE AND OPERABLE SYSTEM INCLUDING CONTROLS FOR THE ACTUAL SELECTED EQUIPMENT/SYSTEM.
- D. PROVIDE ALL STARTERS FOR MECHANICAL MOTORS. REVIEW ELECTRICAL SPECIFICATIONS AND DRAWINGS TO DETERMINE WHICH MECHANICAL MOTOR STARTERS WILL BE PROVIDED UNDER THE ELECTRICAL SPECIFICATION SECTIONS AND PROVIDE ALL OTHERS.
- 3.5 PAINTING
- A. GENERAL: COORDINATE PAINTING OF MECHANICAL EQUIPMENT AND ITEMS WITH PRODUCTS AND METHODS SPECIFIED UNDER SECTION 09900, PAINTING.
- B. PAINTING MATERIALS: MATERIAL SHALL COMPLY WITH SECTION 09900, PAINTING.
- C. UNINSULATED PIPING: PAINT BLACK OR GALVANIZED UNINSULATED PIPING LOCATED BURIED IN GROUND, IN CONCRETE OR MASONRY ONE (1) COAT ACID-RESISTING BLACK PAINT. PAINT BLACK OR GALVANIZED UNINSULATED PIPING IN MOIST EQUIPMENT ROOMS, CRAWL SPACES WITHOUT VAPOR BARRIERS OR EXPOSED TO WEATHER ONE (1) COAT BLACK ASPHALTUM VARNISH.
- D. IRON WORK: PAINT HANGERS, RODS, ANCHORS, GUIDES, THREADS OF GALVANIZED PIPE, BASES, SUPPORTS, UNCOATED SHEET METAL AND OTHER IRON WORK WITHOUT FACTORY FINISH, EXPOSED TO WEATHER, LOCATED IN MOST CONCEALED SPACES AND MOIST EQUIPMENT ROOMS ONE COAT ACID-RESISTING BLACK PAINT. APPLY ONE (1) COAT DIXON'S ALUMINIUM GRAPHITE NO. 209 PAINT OVER THE (1) COAT PRIMER AS RECOMMENDED BY PAINT MANUFACTURER TO ALL HOT METAL SURFACES.
- E. SHEET METAL: APPLY ONE COAT OF ZINC CHROMATE TO MECHANICAL SHEET METAL EXPOSED TO WEATHER, EXCEPT NO PAINTING REQUIRED ON ALUMINUM OR STAINLESS STEEL. APPLY ONE COAT OF FLAT BLACK PAINT TO THE INSIDE OF UNLINED DUCTS BEHIND ALL GRILLES AND REGISTERS.
- F. INSULATED PIPING AND OTHER INSULATED SURFACES: PAINT INSULATED PIPING IN HALF-ROUND, SPLIT TILE, OR OTHER INACCESSIBLE LOCATIONS, ONE (1) COAT ASPHALT EMULSION.

### 3.6 MECHANICAL SYSTEM IDENTIFICATION

- A. PIPING SYSTEM: INDICATE EACH PIPE SYSTEM BY ITS GENERIC NAME (ABBREVIATED) AS SHOWN; EXCEPT VENT AND DRAINAGE PIPING. COMPLY WITH ANSI A13.1 FOR MARKER LOCATIONS, LETTER SIZES, AND COLORS. INCLUDE ARROWS TO SHOW DIRECTION OF FLOW AND "ELECTRIC TRACE" SIGNS TO IDENTIFY HEAT CABLE WRAPPED PIPING.
- B. VALVE IDENTIFICATION: TAG ALL VALVES WITH BRASS DISC AND CHAIN. PREPARE VALVE CHARTS INDICATING VALVE NUMBER, SIZE, LOCATION, FUNCTION AND NORMAL POSITION. USE NO DUPLICATE NUMBERS IN PLUMBING AND HEATING SYSTEMS. MOUNT GLAZED FRAMES CONTAINING ONE SET OF VALVE CHARTS IN THE BUILDING AS DIRECTED.
- C. EACH NEW PIECE OF EQUIPMENT SHALL BEAR A PERMANENTLY ATTACHED IDENTIFICATION PLATE, LISTING THE MANUFACTURER'S NAME, CAPACITIES, SIZES AND CHARACTERISTICS. IN ADDITION TO THE MANUFACTURER'S IDENTIFICATION PLATE, PROVIDE NAMEPLATES OF BLACK PHENOLIC RESIN LAMINATE AND IDENTIFY NEW EQUIPMENT BY NAME AND NUMBER 1/2" HIGH LETTERS.
- D. MOUNT VALVE SCHEDULE(S) AS DIRECTED BY ARCHITECT OR OWNER.
- 3.7 ACCESSIBILITY
- A. LOCATE VALVES, THERMOMETERS, CLEANOUT FITTINGS AND OTHER INDICATING EQUIPMENT OR SPECIALTIES REQUIRING FREQUENT READING, ADJUSTMENTS, INSPECTION, REPAIRS AND REMOVAL OR REPLACEMENT CONVENIENTLY AND ACCESSIBLY WITH REFERENCE TO THE FINISHED BUILDING.
- B. THERMOMETERS AND GAGES: INSTALL THERMOMETERS AND GAGES SO AS TO BE EASILY READ FROM THE FLOORS, PLATFORMS AND WALKWAYS.
- 3.8 INSTALLATION
- A. LOCATING AND POSITIONING EQUIPMENT: COMPLY WITH ALL CODES, REGULATIONS AND OBSERVE GOOD COMMON PRACTICE IN LOCATING AND INSTALLING MECHANICAL EQUIPMENT AND MATERIAL SO THAT COMPLETED INSTALLATION PRESENTS THE LEAST POSSIBLE HAZARD. MAINTAIN ADEQUATE CLEARANCES FOR REPAIR, SERVICE AND OPERATION TO ALL EQUIPMENT AND COMPLY WITH CODE REQUIREMENTS. SET ALL EQUIPMENT LEVEL OR AS RECOMMENDED BY MANUFACTURER.
- B. ARRANGEMENT: ARRANGE DUCTWORK AND PIPING PARALLEL WITH PRIMARY LINES OF THE BUILDING CONSTRUCTION, AND WITH A MINIMUM OF 7" OVERHEAD CLEARANCE IN ALL AREAS WHERE POSSIBLE. CONCEAL ALL PIPING AND DUCTWORK. LOCATE OPERATING AND CONTROL EQUIPMENT PROPERLY TO PROVIDE EASY ACCESS. GIVE RIGHT-OF-WAY TO PIPING WHICH MUST SLOPE FOR DRAINAGE. SET ALL EQUIPMENT LEVEL AS RECOMMENDED BY MANUFACTURER. UNDER NO CONDITIONS SHALL BEAMS, GIRDERS, FOOTINGS OR COLUMNS BE CUT FOR MECHANICAL ITEMS. CASTING OF PIPES INTO CONCRETE IS PROHIBITED UNLESS SO SHOWN ON DRAWINGS.
- C. ANCHORAGE: ANCHOR AND/OR BRACE ALL MECHANICAL EQUIPMENT, PIPING AND DUCTWORK TO RESIST DISPLACEMENT DUE TO SEISMIC ACTION, INCLUDE SNUBBERS ON EQUIPMENT MOUNTED ON SPRING ISOLATORS.
- D. DRIP PANS: PROVIDE DRIP PANS UNDER ALL DOMESTIC HOT WATER HEATERS AND ALL ABOVE CEILING IN-LINE PUMPS AND COOLING COILS. LOCATE PAN IMMEDIATELY BELOW PIPING AND EQUIPMENT, AND EXTEND A MINIMUM OF 6 INCHES ON EACH SIDE AND LENGTHWISE 18 INCHES BEYOND EQUIPMENT BEING PROTECTED. FABRICATE PANS 2 INCHES DEEP, OR REINFORCED SHEET METAL (20 GAUGE COPPER, OR 16 GAUGE STEEL WITH 2 OUNCES ZINC FINISH HOT DIPPED AFTER FABRICATION) WITH ROLLED EDGES AND SOLDERED OR WELDED SEAMS. PROVIDE 3/4 INCH COPPER DRAINAGE PIPING, PROPERLY DISCHARGED TO OVER FLOOR DRAIN OR AS SHOWN ON THE DRAWINGS. COMPLY WITH MECHANICAL CODE SECTIONS 310 AND 1105 FOR OVERFLOW PROTECTION AND PIPE SIZING.
- E. ADJUSTING: ADJUST AND CALIBRATE ALL AUTOMATIC MECHANICAL EQUIPMENT, MIXING VALVES, FLUSH VALVES, FLOAT DEVICES, ETC. ADJUST FLOW RATES AT EACH PIECE OF EQUIPMENT OR FIXTURE.
- F. BUILDING VAPOR BARRIER: WHEREVER THE BUILDING INSULATION VAPOR BARRIER IS PENETRATED BY MECHANICAL PIPING, HANGERS, CONDUTIS, DUCTWORK, ETC., PROVIDE CLEAR SELF-ADHESIVE TAPE RECOMMENDED BY THE INSULATION MANUFACTURER AROUND THE PENETRATIONS.
- 3.9 SYSTEM ADJUSTMENT
- A. ADJUST AND CALIBRATE ALL AUTOMATIC MECHANICAL EQUIPMENT, MIXING VALVES, FLUSH VALVES, FLOAT DEVICES, ETC. ADJUST FLOW RATES AT EACH PIECE OF EQUIPMENT OR FIXTURE. OPEN AND CLOSE ALL SHUTOFF AND CONTROL VALVES SEVERAL TIMES TO INSURE TIGHT GLANDS.
- 3.10 CUTTING AND PATCHING
- A. GENERAL: COMPLY WITH THE REQUIREMENTS OF DIVISION 1 FOR THE CUTTING AND PATCHING OF OTHER WORK TO ACCOMMODATE THE INSTALLATION OF MECHANICAL WORK. DO ALL NECESSARY CUTTING AND PATCHING OF EXISTING YARD SURFACES REQUIRED FOR COMPLETION OF THE MECHANICAL WORK. PATCH TO MATCH FINISH AND COLOR OF ADJACENT SURFACES.

### SECTION 15060 - PIPE AND PIPE FITTINGS

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDED

- A. PROVIDE ALL PIPE, PIPING FITTINGS AND ALL RELATED COMPONENTS REQUIRED FOR COMPLETE PIPING SYSTEM. REFER TO EACH SPECIFICATION SECTION FOR EACH SYSTEM (PLUMBING, HYDRONIC, ETC.) FOR PIPE APPLICATION.
- 1.2 REFERENCES
- A. ANSI/ASME SEC. 9 - WELDING AND BRAZING QUALIFICATIONS.
- B. ANSI/ASTM B32 - SOLDER METAL.
- C. ANSI/AWS D1.1 - STRUCTURAL WELDING CODE.
- D. ASME - BOILER AND PRESSURE VESSEL CODE.
- E. ASTM A53 - PIPE, STEEL, BLACK AND HOT-DIPPED ZINC COATED, WELDED AND SEAMLESS.
- F. ASTM A120 - PIPE, STEEL, BLACK AND HOT-DIPPED ZINC COATED (GALVANIZED), WELDED AND SEAMLESS, FOR ORDINARY USES.
- G. ASTM A536 - DUCTILE IRON CASTINGS.
- H. ASTM F477 - ELASTOMERIC SEALS (GASKETS) FOR JOINING PLASTIC PIPE.
- I. AWS A5.8 - BRAZING FILLER METAL.
- J. AWWA C601 - STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTE WATER.
- K. AWWA C606 - STANDARD SPECIFICATION FOR GROOVED AND SHOULDERED JOINTS.
- L. ASTM D1784 - PVC PIPING.
- M. ASTM D2661 - ABS PIPING.

#### 1.3 QUALITY ASSURANCE

- A. CONFORM TO ANSI/ASME B31.9 FOR PRESSURIZED SYSTEM AS WELL AS ALL APPLICABLE CODES.
- B. WELDING MATERIALS AND PROCEDURES: CONFORM TO ASME CODE AND APPLICABLE STATE LABOR REGULATIONS.
- C. WELDERS CERTIFICATION: IN ACCORDANCE WITH ANSI/ASME SEC. 9. AND ANSI/AWS D1.1.
- D. ALL GROOVED JOINT COUPLINGS, FITTINGS, VALVES, AND SPECIALTIES SHALL BE THE PRODUCTS OF A SINGLE MANUFACTURER. GROOVING TOOLS SHALL BE OF THE SAME MANUFACTURER AS THE GROOVED COMPONENTS.
- E. ALL CASTINGS USED FOR COUPLING HOUSINGS, FITTINGS

#### 1.4 SUBMITTALS

- A. SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 15010 AND DIVISION 1.
- B. INCLUDE DATA ON PIPE MATERIALS, PIPE FITTINGS AND ACCESSORIES.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. DELIVER PRODUCTS TO SITE UNDER PROVISIONS OF SECTION 15010.
- B. STORE AND PROTECT PRODUCTS UNDER PROVISIONS OF SECTION 15010 AND PROVIDE FACTORY APPLIED END CAPS EACH LENGTH OF PIPE AND TUBES TO PREVENT DAMAGE TO PIPE-ENDS AND ELIMINATE DIRT AND MOISTURE FROM INSIDE OF PIPES AND TUBES.

#### PART 2 - PRODUCTS

##### 2.6 NATURAL GAS PIPING AND COMPRESSED AIR PIPING, ABOVE GRADE

- A. ABOVE GRADE
1. STEEL PIPE: ASTM A53 OR A120, SCHEDULE 40 BLACK. FITTINGS: ANSI/ASME B16.3, MALLEABLE IRON, OR ASTM A234, FORGED STEEL WELDING TYPE. JOINTS: SCREWED FOR PIPE TWO INCHES AND UNDER; ANSI/AWS D1-1, WELDED, FOR PIPE OVER TWO INCHES.
  2. (COMPRESSED AIR ONLY) AT THE CONTRACTOR'S OPTION WITH NO ADDITIONAL COST TO OWNER: FOR SIZES LARGER THAN 2 INCH, CUT OR ROLL GROOVED BLACK STEEL PIPE WITH VICTAULIC STYLE 107/ 077/ 177/ 77 COUPLINGS WITH GRADE "EHP", "E", OR "T" GASKETS AND APPROPRIATE FITTINGS.
  3. (COMPRESSED AIR ONLY) AT THE CONTRACTOR'S OPTION WITH NO ADDITIONAL COST TO OWNER: FOR SIZES 2 INCH AND SMALLER, PLAIN END STAINLESS STEEL PIPE WITH VICTAULIC VIC-PRESS 304™ COUPLINGS AND FITTINGS AND GRADE "E" OR "T" O-RING SEALS MAY BE USED IN LIEU OF SCREWED JOINTS WITH STEEL PIPE.

TENANT IMPROVEMENT FOR:

BSD OAK HILLS ELEMENTARY- TR REMODEL

2625 NW 153RD. AVE.

BEAVERTON, OREGON 97006

PLUMBING SPECIFICATION

P2.1

JOB NO. 20Y007.01

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ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET



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- A. BELOW GRADE (NATURAL GAS ONLY)
- POLYETHYLENE PIPE: PE PIPE, SUPPLIED UNDER THIS SPECIFICATION SHALL CONFORM TO THE CURRENT EDITION OF THE SPECIFICATION FOR THERMOPLASTIC GAS PRESSURE PIPE, TUBING AND FITTINGS (ASTM D2513). THE PE PLASTIC COMPOUND SHALL BE EITHER PHILLIPS TR-418 OR PLEXOC P248C AND SHALL MEET THE REQUIREMENTS OF TYPE II, CLASS B, CATEGORY 3, GRADE P24, IN ASTM D-1248 "STANDARD SPECIFICATION FOR POLYETHYLENE PLASTICS MOLDING AND EXTRUSION MATERIALS".
  - MARKING: PIPE AND TUBING FURNISHED UNDER THIS SPECIFICATION SHALL BE MARKED IN ACCORDANCE WITH THE CURRENT EDITION OF THE SPECIFICATION FOR THERMOPLASTIC GAS PRESSURE PIPE, TUBING AND FITTINGS (ASTM D2513).
    - THE FOLLOWING INFORMATION SHALL BE INCLUDED:
      - MANUFACTURER
      - TYPE OF PIPE OR TYPE OF TUBING
      - NOMINAL SIZE (E.G. 1-1/4", 2" ETC.) OR OD
      - WALL THICKNESS OR SDR
      - CODE NO. IDENTIFYING MONTH OF PRODUCTION AND RESIN
      - THE WORDS "GAS PIPE OR "GAS TUBING"
    - A CODE SYSTEM WHICH CAN BE USED TO IDENTIFY THE ABOVE INFORMATION IN THE RECORDS MAY BE USED.
  - COILING: PE PIPE AND TUBING SHALL BE FURNISHED IN COILS. THE AMOUNT OF FOOTAGE PER COIL SHALL BE AS SPECIFIED BELOW UNLESS OTHERWISE SPECIFIED ON THE PURCHASE ORDER. EACH COIL SHALL CONSIST OF A SINGLE LENGTH OF PIPE. JOINTS SHALL NOT BE PERMITTED. 4" IPS, AND 6" IPS PE PIPE SHALL BE FURNISHED IN STRAIGHT LENGTHS 40 FEET LONG. A STRAIGHT LENGTH SHALL CONSIST OF A SINGLE LENGTH OF PIPE. JOINTS WILL NOT BE PERMITTED.
  - FITTINGS: ASTM D2513 SOCKET TYPE. JOINTS: FUSION WELDED. PROVIDE MINIMUM 14 GAUGE SINGLE STRAND, COPPER WIRE WITH ORANGE COLOR INSULATING COATING.
- C. ABOVE GRADE, FLEXIBLE
- STANDARDS & CERTIFICATIONS
    - CSA INTERNATIONAL CERTIFIED CORRUGATED STAINLESS STEEL TUBING (CSST) FLEXIBLE GAS PIPING WITH MECHANICAL ATTACHMENT AUTOFLARE® FITTINGS THAT CONFORM TO THE LATEST ANSI STANDARDS FOR SAFE PERFORMANCE ANSI/CSA LC-1.
    - UNDERWRITERS LABORATORIES CLASSIFICATION LISTED FOR THRU PENETRATION FIRE STOP REQUIREMENTS RATINGS TO INCLUDE ONE, TWO AND FOUR HOUR TESTS.
    - LISTED WITH FM (FACTORY MANUAL) REQUIREMENTS FOR FLAMMABLE GAS PIPING SYSTEMS.
  - STAINLESS STEEL TUBING
    - TUBING SHALL BE MADE FROM 300 SERIES STAINLESS STEEL STRIP CONFORMING TO ASTM A240.
    - TUBING SHALL BE SUITABLE FOR OPERATION WITH NATURAL GAS AND LP GAS (PROPANE).
    - TUBING IS RATED FOR 25-PSI.
    - TUBING MUST HAVE ELEVATED PRESSURE RATINGS OF 1250 FOR SIZES UP TO 1-1/4 INCHES AND 250 FOR 1-1/2 AND 2-INCH SIZES FOR HIGH-PRESSURE APPLICATIONS PERMITTED BY THE LOCAL DISTRIBUTION UTILITY. THESE ELEVATED PRESSURE RATINGS SHALL BE DEMONSTRATED BY TEST REPORTS FROM THE CERTIFICATION AGENCY.
  - PLASTIC JACKET
    - THE JACKET SHALL BE EXTRUDED FROM FIRE-RETARDED POLYETHYLENE.
    - CHLORINATED PLASTICS SUCH AS PVC ARE NOT PERMITTED.
    - ASTM E-84 FLAME SPREAD RATING SHAL NOT EXCEED 25.
    - ASTM E84 SMOKE DENSITY RATING SHALL NOT EXCEED 50.
    - POLYETHYLENE IS TO BE RESISTANT TO UV.
  - AUTOFLARE® MECHANICAL ATTACHMENT FITTINGS.
    - FITTINGS SHALL BE MADE FROM YELLOW BRASS.
    - FITTINGS SHALL BE EQUIPPED WITH A STAINLESS STEEL INSERT TO PIOT ON THE TUBING ID AND PROVIDE A RELIABLE FLARING OPERATION.
    - AUTOFLARE FITTINGS ARE TESTED AND LISTED BY CSA INTERNATIONAL FOR CONCEALED USE WHERE REQUIRED.
    - FITTINGS SHALL PROVIDE A METAL-TO-METAL SEAL (NO GASKETS).
  - PROTECTIVE DEVICES
    - STRIKER PLATES SHALL BE LISTED AS PART OF THE OMEGAFLEX, INC. TRAC PIPE SYSTEM AND SHALL BE MARKED WITH THE SYMBOL OF THE MANUFACTURER (OMEGAFLEX, INC.) AND THE LISTING AGENCY (CSA INTERNATIONAL).
    - STRIKER PLATES SHALL BE MADE FROM CARBON STEEL, HEAT-TREATED TO RB40. STRIKER PLATES ARE AVAILABLE IN QUARTER, HALF, THREE QUARTER, FULL AND 6 X 17 CONFIGURATIONS.
  - ACCESSORIES
    - TERMINATION MOUNT FITTINGS ARE TO BE USED TO PROVIDE A SECURE TERMINATION FOR THE TUBING AT MOVEABLE APPLIANCE LOCATIONS AND OTHER "STUB-OUT" POINTS DEPENDING ON BUILDING CONSTRUCTION. TERMINATION MOUNT ACCESSORIES CONSIST OF A PLATED CARBON STEEL PLATE OR BRASS MOUNTING FLANGE AND AN AUTOFLARE FITTING. FITTINGS AT TERMINATION MOUNTS MUST BE ACCESSIBLE AND PROVIDE A FITTING JOINT EXTERIOR TO THE BUILDING FLOOR OR WALL.
    - METER TERMINATION FITTINGS MAY BE USED FOR EXTERIOR WALL PENETRATIONS AT METER LOCATIONS AND OTHER PENETRATIONS SUCH AS ROOF TOPS UNITS. METER TERMINATION CONSISTS OF A PLATED CARBON STEEL MOUNTING PLATE AND SLEEVE AND AN AUTOFLARE FITTING. FITTINGS AT METER TERMINATION OUTLETS MUST BE ACCESSIBLE AND PROVIDE A FITTING JOINT EXTERIOR TO THE BUILDING.
    - SHUT-OFF VALVES MUST BE APPROVED FOR FUEL GAS SERVICE AND MUST BE RATED FOR THE PRESSURE OF THE GAS PIPING SYSTEM INSTALLED. FOR ELEVATED PRESSURE SECTIONS AN APPROVED VALVE MUST BE LOCATED UPSTREAM FROM THE POUNDS-TO-INCHES REGULATOR.
    - ELECTRICAL BONDING/GROUNDING
      - THE TRACPIPE FLEXIBLE GAS PIPING SYSTEM MUST BE BONDED TO AN EFFECTIVE GROUND-FAULT CURRENT PATH PER NFPA 70 AND NFPA 54 IN ACCORDANCE WITH THE INSTRUCTIONS CONTAINED IN THIS SECTION.
- 2.13 FIRE SPRINKLER:
- PIPE: SYSTEMS 10 INCHES OR SMALLER, OPERATING BELOW 400 PSI, SCHEDULE 40, STANDARD BLACK STEEL PIPE ASTM A-120 OR A-53.
  - THREADED FITTINGS: FOR ABOVEGROUND INSTALLATIONS ONLY.
    - BANDED CLASS 120 CAST IRON FITTINGS, ANSI B16.4 TO 125 PSI.
    - BANDED CLASS 150 MALLEABLE IRON FITTINGS, ANSI B16.3 TO 150 PSI.
  - WELDED FITTINGS: FOR ALL UNDERGROUND INSTALLATIONS, BEVELED ENDS, SEAMLESS FITTINGS OF THE SAME TYPE AND CLASS OF PIPING ABOVE.
  - FLANGED FITTINGS: FOR ABOVEGROUND INSTALLATIONS ONLY.
    - CLASS 125 CAST IRON FITTINGS, ANSI B16.2 INCLUDING BOLTING TO 125 PSI.
    - CLASS 150 STEEL WELDING NECK FLANGES, ANSI B16.9 TO 150 PSI.
    - CLASS 250 CAST IRON FITTINGS, ANSI B16.1 INCLUDING BOLTING TO 250 PSI.
    - FACING AND GASKETING: SELECTED FOR SERVICE PRESSURES AND TEMPERATURES. FULL-FACED FOR CAST IRON AND RAISED FACE FOR STEEL FLANGES.
  - GROOVED FITTINGS: FOR ABOVEGROUND LIQUID INSTALLATIONS ONLY, OF GROOVED OR SHOULDERED END DESIGNED TO ACCEPT GROOVED MECHANICAL COUPLINGS WITHOUT FIELD PREPARATION. MATCH GASKETS FOR SERVICE AND TEMPERATURE INDICATED.
    - MALLEABLE IRON: ASTM A-47.
    - DUCTILE IRON: ASTM A-536.
    - FABRICATED STEEL: ASTM A-53, 3/4 INCH TO 1-1/2 INCHES TYPE F; 2 - 20 INCHES TYPE E OR S, GRADE B.
    - STEEL: ASTM A-234, (A-106, GR. B) (11-24 INCHES 45 DEGREE AND 90 DEGREE ELBOWS).
    - MANUFACTURERS: VICTAULIC, GUSTIN-BACON OR ACCEPTED SUBSTITUTE.
- 2.14 MISCELLANEOUS PIPING MATERIAL
- WELDING MATERIALS: PROVIDE WELDING MATERIALS AS DETERMINED BY THE INSTALLER TO COMPLY WITH INSTALLATION REQUIREMENTS. COMPLY WITH SECTION 2-C, ASME BOILER CODE FOR WELDING MATERIALS.
  - SOLDERING AND BRAZING MATERIALS: PROVIDE SOLDERING MATERIALS AS DETERMINED BY THE INSTALLER TO COMPLY WITH INSTALLATION REQUIREMENTS.
    - TIN-ANTIMONY SOLDER: ASTM B32, GRADE 95TA.
    - LEAD-FREE SOLDER: ASTM B32, GRADE HB. HARRIS "BRIDGIT" APPROVED.
  - SILVER SOLDER: ASTM B32, GRADE 96.5TS.

- GASKETS FOR FLANGED JOINTS: ANSI B16.21; FULL-FACED FOR CAST-IRON FLANGES; RAISED-FACE FOR STEEL FLANGES. PRESSURE AND TEMPERATURE RATING REQUIRED FOR THE SERVICE INDICATED.
  - SLEEVE SEAL: RUBBER-LINK PIPE WALL AND CASING CLOSURE. THUNDERLINE LINK-SEAL. FOR FIRE RATED WALL, FLOOR OR CEILING PENETRATIONS, 3-M "CP-25" CAULK, "NO. 303" PUTTY AND/OR "PSS 7904" SEALING SYSTEM.
  - TRACER WIRE: 14 GAUGE, SINGLE STRAND, COPPER WIRE WITH BLUE INSULATION FOR WATER, GREEN FOR SANITARY AND STORM SEWERS, AND ORANGE FOR GAS. 3M "DBY" DIRECT BURY SPLICE KIT REQUIRED AT ALL SPLICES.
- 2.15 FLANGES, UNIONS, AND COUPLINGS
- PIPE SIZE 2 INCHES AND UNDER: 150 PSIG MALLEABLE IRON UNIONS FOR THREADED FERROUS PIPING; BRONZE UNIONS FOR COPPER PIPE, SOLDERED JOINTS.
  - PIPE SIZE OVER 2 INCHES: 150 PSIG FORGED STEEL SLIP-ON FLANGES FOR FERROUS PIPING; BRONZE FLANGES FOR COPPER PIPING; NEOPRENE GASKETS FOR GAS SERVICE; 1/16 INCH THICK PERFORMED NEOPRENE BONDED TO ASBESTOS.
  - GROOVED AND SHOULDERED PIPE END COUPLINGS: MALLEABLE IRON HOUSING CLAMPS TO ENGAGE AND LOCK, DESIGNED TO PERMIT SOME ANGULAR DEFLECTION, CONTRACTION, AND EXPANSION; "C" SHAPE COMPOSITION SEALING GASKET; STEEL BOLTS, NUTS, AND WASHERS; GALVANIZED COUPLINGS FOR GALVANIZED PIPE.
  - DIELECTRIC CONNECTIONS: UNION WITH GALVANIZED OR PLATED STEEL THREADED END, COPPER SOLDER END, WATER IMPERVIOUS ISOLATION BARRIER. VICTAULIC "CLEAR FLOW", EPCO OR ACCEPTED SUBSTITUTE.
- 2.16 PIPE SLEEVES
- MINIMUM 20 GAUGE GALVANIZED STEEL IN CONCRETE, 18 GAUGE IN ALL OTHER CONSTRUCTION. PROVIDE 1/2-INCH CLEARANCE AROUND PIPE OR INSULATION. PROVIDE UL APPROVED FIRE-RATED ASSEMBLIES/CAULKING. 3M OR ACCEPTED SUBSTITUTE.
- 2.17 ESCUTCHEONS
- BRASS MATERIAL, CHROME PLATED FINISH. SIZE TO COVER ALL PIPE OPENINGS THROUGH WALL, FLOOR OR CEILING. SET SCREW OR SPRING TO SECURE PIPE. COORDINATE ALL OPENING SIZES.
- 2PART 3 - EXECUTION
- 3.1 PREPARATION
- REAM PIPE AND TUBE ENDS. REMOVE BURRS OR BEVEL PLAIN END FERROUS PIPE.
  - REMOVE SCALE AND DIRT, ON INSIDE AND OUTSIDE, BEFORE ASSEMBLY.
  - PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES OR UNIONS.
- 3.2 INSTALLATION
- PROVIDE NON-CONDUCTING DIELECTRIC CONNECTIONS WHEREVER JOINTING DISSIMILAR METALS.
  - ROUTE PIPING IN ORDERLY MANNER, MAINTAIN GRADIENT AND CONCEAL ALL PIPING UNLESS OTHERWISE INDICATED.
  - INSTALL PIPING TO CONSERVE BUILDING SPACE, NOT TO INTERFERE WITH USE OF SPACE OR ACCESS PANELS AND PARALLEL WITH WALLS.
  - GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS.
  - INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT. PROVIDE LOOPS, SWING JOINTS, PINCHERS, RUNOUTS AND SPRING PIECES TO PREVENT DAMAGE TO PIPING OR EQUIPMENT.
    - FOR WATER SYSTEMS, USE ADEQUATE NUMBERS OF VICTAULIC STYLE 177/777 FLEXIBLE COUPLINGS IN HEADER PIPING TO ACCOMMODATE THERMAL GROWTH AND CONTRACTION, AND FOR THE ELIMINATION OF EXPANSION LOOPS. (IN ACCORDANCE WITH VICTAULIC INSTRUCTIONS AND AS APPROVED BY THE ENGINEER). WHERE EXPANSION LOOPS ARE REQUIRED, USE VICTAULIC STYLE 177/777 COUPLINGS ON THE LOOPS.
  - PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS.
  - SLOPE WATER PIPING AND ARRANGE TO DRAIN AT LOW POINTS AND PROVIDE DRAIN VALVE.
  - ESTABLISH ELEVATIONS OF BURIED WATER PIPING OUTSIDE THE BUILDING TO ENSURE NOT LESS THAN 3 FEET OF COVER.
  - WHERE PIPE SUPPORT MEMBERS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN, AND APPLY ONE COAT OF ZINC RICH PRIMER TO WELDING.
  - PREPARE PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES NOT PREFINISHED, READY FOR FINISH PAINTING. REFER TO SECTION 15050-3.5.
  - ESTABLISH INVERT ELEVATIONS, SLOPES FOR DRAINAGE TO 1/4 INCH PER FOOT MINIMUM. MAINTAIN GRADIENTS.
  - PITCH VENT PIPING AT 1/4 INCH PER 10 FEET MINIMUM.
  - ESTABLISH ELEVATIONS OF ALL HEATING AND COOLING PIPING TO ENSURE MINIMUM OF 1 INCH PITCH FOR EVERY 40 FEET TO LOW POINT DRIP OR DRAINS.
  - UNIONS AND FLANGES: AT ALL EQUIPMENT TO PERMIT DISMANTLING AND ELSEWHERE AS CONSISTENT WITH GOOD INSTALLATION PRACTICE.
  - TRACER WIRE: PROVIDE TRACER WIRE AS CLOSE TO UNDERGROUND NON-METALLIC WATER, SANITARY AND STORM SEWERS AND GAS PIPE IN THE TRENCH AS POSSIBLE. TRACER WIRE SHALL BE ACCESSIBLE AT GRADE VIA ALL SERVICES, VALVE AND METER BOXES, CURB COCKS, CLEANOUTS AT THE BUILDING, MANHOLES (INSIDE THE COVER NEAR THE TOP), ETC. LOCATE ALL POINTS ON THE RECORD AS-INSTALLED DRAWINGS. SPlice INTO UTILITY TRACER SYSTEM WHERE AVAILABLE. COMPLY WITH CODE REQUIREMENTS.
  - CROSS-LINKED POLYETHYLENE TUBING AND FITTINGS:
    - TUBING UNDER CONCRETE SLAB: INSTALL TUBING IN EXCAVATED DITCH BELOW CONCRETE SLAB. BACKFILL TUBING WITH SAND. WHEN MAKING 90-DEGREE BENDS EXITING THE SLAB, USE METALLIC 90-DEGREE ELBOWS (ONE SIZE LARGER THAN NOMINAL TUBING).
    - TUBING THROUGH WALL OR OVERHEAD: TUBING SLACK OF 1.8 TO 3/16-INCH PER LINEAL FOOT SHALL BE ALLOWED TO ACCOMMODATE THERMAL EXPANSION. DO NOT PULL TUBING TIGHT DURING INSTALLATION. DO NOT RIGIDLY ANCHOR TUBING. PROTECT TUBING PASSING THROUGH HOLLOW MASONRY WALLS OR METAL STUDS WITH SLEEVES OR GROMMETS (SEMCO TRISOLATORS OR ACCEPTED SUBSTITUTE). PROTECT TUBING FROM NAIL OR SCREW DAMAGE WITH STEEL PLATE PROTECTORS.
    - TUBING SUPPORTS: USE PLASTIC PIPE SUPPORTS OR SUPPORTS DESIGNED FOR USE WITH PLASTIC TUBING. PROVIDE VERTICAL SUPPORT AT EVERY FLOOR WITH A GUIDE PLACED BETWEEN FLOORS.
    - JOINTS AND CONNECTIONS: MAKE FITTINGS AND CONNECTIONS IN COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS. MAKE TRANSITION JOINTS WITH MANUFACTURER APPROVED FITTINGS ONLY.
    - FIRE RATED WALL, FLOOR OR CEILING PENETRATIONS: FIRESTOPPING SHALL CONFORM TO BOTH FLAME AND TEMPERATURE RATINGS AS REQUIRED BY LOCAL BUILDING CODES AND ASTM E814. USE FIRESTOP MATERIAL COMPATIBLE WITH TUBING.
    - INSPECTION AND TESTING: AFTER COMPLETION OF ANY SECTION OF THE INSTALLATION, TEST AND INSPECT SO THERE ARE NO VISIBLE SIGNS OF LEAKAGE, CRACKS, GOUGES OR EXCESS DEBRIS.
    - CORROSION CONTROL UNDERGROUND STEEL PIPING CORROSION PROTECTION: FACTORY WRAP ALL UNINSULATED UNDERGROUND STEEL PIPING SYSTEMS WITH PROTECTIVE COATING COMPOSED OF A COAL-TAR SATURATED WRAPPING TAPE OVER A 20 MIL THICK COAL-TAR EPOXY COATING. WRAP JOINTS WITH A MINIMUM OF 1/2 WIDTH OF WRAP. EXTEND WRAP NOT LESS THAN 4-INCHES ABOVE GRADE.
  - PIPE SLEEVES: LAY OUT WORK IN ADVANCE OF POURING CONCRETE AND FURNISH AND SET SLEEVES NECESSARY TO COMPLETE WORK.
    - FLOOR SLEEVES: PROVIDE SLEEVES ON PIPES PASSING THROUGH CONCRETE CONSTRUCTION. EXTEND SLEEVE 2-INCHES ABOVE FINISHED FLOOR. CAULK ALL PIPES PASSING THROUGH FLOOR WITH NONSHRINKING GROUT OR APPROVED CAULKING COMPOUND. PROVIDE LINK-SEAL SLEEVE SEALING SYSTEM FOR SLAB ON GRADE. CAULK/SEAL ALL PIPING PASSING THROUGH FIRE RATED BUILDING ASSEMBLIES WITH UL RATED ASSEMBLIES. PROVIDE FIRE-RATED ASSEMBLIES PER LOCAL CODE REQUIREMENTS.
    - WALL SLEEVES: PROVIDE SLEEVES ON PIPES PASSING THROUGH CONCRETE OR MASONRY CONSTRUCTION. PROVIDE SLEEVE FLUSH WITH FINISHED FACE OF WALL. CAULK ALL PIPES PASSING THROUGH WALLS WITH NONSHRINKING CAULKING COMPOUND. CAULK/SEAL ALL PIPING PASSING THROUGH FIRE RATED BUILDING ASSEMBLIES WITH UL RATED ASSEMBLIES. PROVIDE FIRE-RATED ASSEMBLIES PER LOCAL CODE REQUIREMENTS.
  - EXPANSION AND FLEXIBILITY: INSTALL ALL WORK WITH DUE REGARD FOR EXPANSION AND CONTRACTION TO PREVENT DAMAGE TO PIPING, DUCTWORK, EQUIPMENT, BUILDING AND ITS CONTENTS. PROVIDE PIPING OFFSETS, LOOPS, APPROVED TYPE EXPANSION JOINTS, ANCHORS OR OTHER MEANS TO CONTROL PIPING MOVEMENT AND TO MINIMIZE PIPE FORCES.
  - ESCUTCHEONS: INSTALL ON ALL EXPOSED PIPES PASSING THROUGH WALL OR FLOORS AND ON FIXTURE STOPS AND WASTE CONNECTIONS TO WALL.
- 3.3 EXCAVATION
- GENERAL: DO NOT EXCAVATE FOR MECHANICAL WORK UNTIL THE WORK IS READY TO PROCEED WITHOUT DELAY. TO MINIMIZE THE TOTAL TIME LAPSE FROM EXCAVATION TO COMPLETION OF BACKFILLING. COMPLY WITH ALL APPLICABLE FEDERAL AND STATE SAFETY REGULATIONS.
  - WIDTH: EXCAVATE FOR PIPING WITH 6 INCHES TO 9 INCHES CLEARANCE ON BOTH SIDES OF PIPE, EXCEPT WHERE OTHERWISE SHOWN OR REQUIRED FOR PROPER INSTALLATION OF PIPE JOINTS, FITTINGS, VALVES AND OTHER WORK. EXCAVATE FOR OTHER MECHANICAL WORK TO PROVIDE MINIMUM PRACTICAL BUT ADEQUATE WORKING CLEARANCES.
  - DEPTH FOR DIRECT SUPPORT: FOR WORK TO BE SUPPORTED DIRECTLY ON UNDISTURBED SOIL, DO NOT EXCAVATE BEYOND INDICATED DEPTHS, AND HAND-EXCAVATE THE BOTTOM CUT TO ACCURATE ELEVATIONS. SUPPORT THE FOLLOWING WORK ON UNDISTURBED SOIL AT THE BOTTOM OF THE EXCAVATIONS:
    - PIPING OF 5 INCHES AND LESS PIPE/TUBE SIZE.
    - CAST-IN-PLACE CONCRETE.

- DEPTH FOR SUBBASE SUPPORT: FOR LARGE PIPING (6 INCHES PIPE SIZE AND LARGER), TANKS AND WHERE INDICATED FOR OTHER MECHANICAL WORK, EXCAVATE FOR INSTALLATION OF SUBBASE MATERIAL IN THE DEPTH INDICATED, OR, IF NOT OTHERWISE INDICATED, 6 INCHES BELOW BOTTOM OF WORK TO BE SUPPORTED.
- DEPTH FOR UNSATISFACTORY SOIL CONDITIONS: WHERE UNSATISFACTORY SOIL CONDITION AT THE BOTTOM OF EXCAVATION EXISTS, EXCAVATE ADDITIONAL DEPTH AS DIRECTED TO REACH SATISFACTORY SOIL-BEARING CONDITION. BACKFILL WITH SUBBASE MATERIAL, COMPACTED AS DIRECTED, TO INDICATED EXCAVATION DEPTH.
- EXCAVATED MATERIALS: STORE EXCAVATED MATERIAL (TEMPORARILY) NEAR THE EXCAVATION, IN A MANNER WHICH WILL NOT INTERFERE WITH OR DAMAGE THE EXCAVATION OR OTHER WORK. DO NOT STORE UNDER TREES (WITHIN THE DRIP LINE). RETAIN EXCAVATED MATERIAL WHICH COMPLIES WITH THE REQUIREMENTS FOR BACKFILL MATERIAL. DISPOSE OF EXCAVATED MATERIAL WHICH IS EITHER IN EXCESS OF QUANTITY NEEDED FOR BACKFILLING OR DOES NOT COMPLY WITH REQUIREMENTS FOR BACKFILL MATERIAL.

#### 3.4 BASE PREPARATION

- SUBBASE INSTALLATION: WHERE INDICATED, INSTALL SUBBASE MATERIAL TO RECEIVE MECHANICAL WORK, AND COMPACT BY TAMPING TO FORM A FIRM BASE FOR THE WORK. FOR 4 INCHES AND LARGER PIPING, HORIZONTAL CYLINDRICAL TANKS AND SIMILAR WORK, SHAPE AND SUBBASE TO FIT THE SHAPE OF THE BOTTOM 90 DEGREES OF THE CYLINDER, FOR UNIFORM CONTINUOUS SUPPORT. PROVIDE FINELY-GRADED SUBBASE MATERIAL FOR WRAPPED, COATED AND PLASTIC PIPE AND TANK. SHAPE SUBBASES AND BOTTOMS OF EXCAVATION WITH RECESSES TO RECEIVE PIPE BELLS, FLANGES CONNECTIONS, VALVES AND SIMILAR ENLARGEMENTS IN THE PIPING SYSTEMS AND SET BOTTOM OF TRENCH AT PROPER PITCH AND CORRECT ELEVATIONS WITH SUBBASE MATERIAL.

#### 3.5 BACKFILLING

- DO NOT BACKFILL UNTIL INSTALLED MECHANICAL WORK HAS BEEN TESTED AND ACCEPTED WHEREVER TESTING IS INDICATED. INSTALL DRAINAGE FILL WHERE INDICATED, AND TAMP TO A UNIFORM FIRM DENSITY. BACKFILL WITH FINELY-GRADED SUBBASE MATERIAL TO 6 INCHES ABOVE WRAPPED, COATED AND PLASTIC PIPING AND TANKS, AND TO CENTER LINE OF OTHER TANKS (WHERE RECOMMENDED BY TANK MANUFACTURER, USE "SEA GRAVEL" BACKFILL). CONDITION BACKFILL MATERIAL BY EITHER DRYING OR ADDING WATER UNIFORMLY, TO WHATEVER EXTENT MAY BE NECESSARY TO FACILITATE COMPACTION TO THE REQUIRED DENSITIES. DO NOT BACKFILL WITH FROZEN MATERIALS.

#### 3.7 CLEANING

- GENERAL: CLEAN ALL DIRT AND CONSTRUCTION DUST AND DEBRIS FROM ALL MECHANICAL PIPING SYSTEMS AND LEAVE IN A NEW CONDITION. TOUCH UP PAINT WHERE NECESSARY.
- SANITARY AND STORM DRAINAGE SYSTEM:
  - REMOVE CONSTRUCTION DEBRIS FROM CLEANOUTS, DRAINS, STRAINERS, BASKETS, TRAPS, ETC., AND LEAVE SAME ACCESSIBLE AND OPERABLE. PLACE PLUGS IN THE END OF UNCOMPLETED PIPING AT THE END OF THE DAY OR WHENEVER WORK TOPS.
  - BEFORE FINAL ACCEPTANCE OF COMPLETED SEWER SYSTEM, FLUSH AND CLEAN THE ENTIRE SYSTEM WITH WATER. TRAP AND REMOVE SOLID MATERIAL OBTAINED FROM FLUSHING AND CLEANING FROM THE NEW SYSTEM. DO NOT ALLOW DEBRIS TO ENTER THE SEWER SYSTEM.
- GAS PIPING: BLOW CLEAR OF DEBRIS WITH NITROGEN OR OIL FREE AIR. CLEAN ALL LOW POINT STRAINERS AND POCKETS.
- HEATING AND CHILLED WATER SYSTEMS:
  - USE ONE POUND OF TRISODIUM PHOSPHATE PER 50 GALLONS IN THE SYSTEM, OR ONE POUND OF SODIUM CARBONATE FOR EACH 30 GALLONS IN THE SYSTEM OR ONE POUND OF SODIUM HYDROXIDE (LYE) FOR EACH 50 GALLONS IN THE SYSTEM.
  - FILL, VENT AND CIRCULATE THE SYSTEM WITH THIS SOLUTION AT DESIGN OPERATING TEMPERATURE. AFTER CIRCULATING FOR FOUR HOURS, DRAIN AND FILL WITH FRESH WATER INCLUDING GLYCOL.
  - TEST FOR PH AND ADD SUFFICIENT AMOUNT OF THE CLEANING CHEMICAL TO OBTAIN A PH BETWEEN 7 AND 8.
  - CLEAN ALL STRAINERS AND REMOVE START-UP STRAINERS (FROM SUCTION DIFFUSERS) AFTER THE SYSTEM HAS OPERATED FOR ONE WEEK.

#### 3.8 TEST

- GENERAL
  - MINIMUM DURATION OF TWO HOURS OR LONGER, AS DIRECTED FOR ALL TESTS. FURNISH REPORT OF TEST OBSERVATION SIGNED BY QUALIFIED INSPECTOR. MAKE ALL TESTS BEFORE APPLYING INSULATION, BACKFILLING, OR OTHERWISE CONCEALING PIPING OR CONNECTING FIXTURES OR EQUIPMENT. WHERE PART OF THE SYSTEM MUST BE TESTED TO AVOID CONCEALMENT BEFORE THE ENTIRE SYSTEM IS COMPLETE, TEST THAT PORTION SEPARATELY, SAME AS FOR ENTIRE SYSTEM.
  - SEWER: FURNISH ALL FACILITIES AND PERSONNEL FOR CONDUCTING THE TEST. TEST IN ACCORD WITH THE REQUIREMENTS OF STATE PLUMBING INSPECTOR AND LOCAL AUTHORITIES.
  - PLUMBING WASTE AND VENT PIPING: HYDROSTATIC TEST BY FILLING TO HIGHEST POINT, BUT NOT LESS THAN 10 FOOT WATER COLUMN ON MAJOR HORIZONTAL PORTION.
  - WATER PIPING: HYDROSTATIC PRESSURE OF 100 PSIG WITHOUT LOSS FOR FOUR HOURS.
  - NATURAL GAS PIPING: ONE HALF HOUR MINIMUM AIR AT 60 PSIG FOR 2 PSIG GAS, AND 15 MINUTES AT 10 PSIG FOR 7 INCH WATER GAUGE NATURAL GAS OR AS APPROVED AND CERTIFIED BY SERVING UTILITY.
  - COMPRESSED AIR PIPING: TWENTY-FOUR HOUR, 125 PSI WITH NO PRESSURE LOSS.
  - HEATING AND CHILLED WATER PIPING: 75 PSIG HYDROSTATIC FOR 30 PSIG SYSTEMS WITHOUT LOSS FOR FOUR HOURS.

#### SECTION 15100 - VALVES

##### PART 1 - GENERAL

###### 1.1 WORK INCLUDED

- THE REQUIREMENTS OF THIS SECTION APPLY TO THE VALVING FOR THE SYSTEMS SPECIFIED ELSEWHERE IN DIVISION 15.

###### 1.2 QUALITY ASSURANCE

- PROVIDE VALVES FROM A SINGLE MANUFACTURER WHERE POSSIBLE WITH MANUFACTURER'S NAME AND PRESSURE RATING MARKED ON VALVE BODY.
- ALL CASTINGS USED FOR VALVE BODIES SHALL BE DATE STAMPED FOR QUALITY ASSURANCE AND TRACEABILITY.
- VALVE SIZE SHALL BE THE SAME AS CONNECTING PIPE SIZE UNLESS OTHERWISE NOTED.
- GROOVED END VALVES SHALL BE OF THE SAME MANUFACTURER AS THE ADJOINING COUPLINGS.

###### 1.3 SUBMITTALS

- SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 15010.
- INCLUDE DATA ON VALVES AND ACCESSORIES.

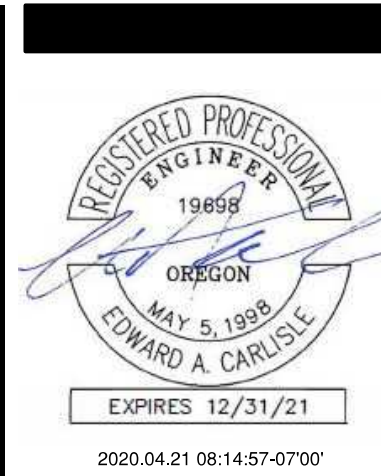
###### PART 2 - PRODUCTS

###### 2.1 BALL, CHECK, STOP CHECK, NON SLAM CHECK, BUTTERFLY, GATE, GLOBE, LUBRICATED PLUG VALVE TYPES

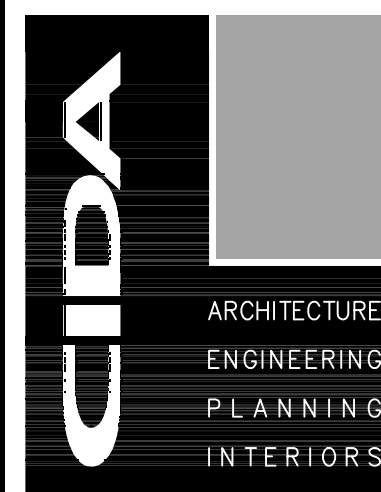
- MANUFACTURERS: CRANE, ITT, GRINNELL, HAMMOND, JENKINS, KENNEDY, MUELER, LUNKENHEIMER, MILWAUKEE, NIBCO, POWELL, APOLLO, STOCKHAM, WALWORTH, LEGEND OR ACCEPTED SUBSTITUTE. GROOVED END VALVES VICTAULIC, GUSTIN-BACON OR ACCEPTED SUBSTITUTE. VICTAULIC (GROOVED END) AND GRINNELL (SCREWED/FLANGED) NUMBERS ARE GIVEN EXCEPT AS NOTED.

###### B. DOMESTIC WATER AND CHILLED WATER SYSTEMS:

- VALVES 2 INCHES AND SMALLER.
  - BALL:
    - VICTAULIC SERIES 589 (BRASS BODY) AND 569 (STAINLESS STEEL BODY).
    - FIG. 3500. 125 PSI, BRONZE BODY, FULL PORT.
  - CHECK, FIG. 3300. CLASS 125, BRONZE BODY, HORIZONTAL SWING.
  - GATE, FIG. 3050. 150 PSI, BRONZE BODY, NON-RISING STEM.
- VALVES 2 INCHES AND LARGER:
  - BUTTERFLY VALVE:
    - (<250 DEG. F), VICTAULIC MASTERSEAL; STEM SHALL BE OFFSET FROM THE DISC CENTERLINE TO PROVIDE FULL 360-DEGREE CIRCUMFERENTIAL SEATING, PRESSURE RESPONSIVE SEAT, 300 PSI, DUCTILE IRON BODY.
    - (<230 DEG. F), VICTAULIC SERIES 608; COPPER-TUBE DIMENSIONED GROOVED ENDS, 300 PSI, CAST BRONZE BODY.
    - (<200 DEG. F), FIG. 8000. 150 PSI, CAST IRON BODY.
  - CHECK:
    - VICTAULIC SERIES 716, 300 PSI, DUCTILE IRON BODY, HORIZONTAL OR VERTICAL, WITH STAINLESS STEEL SPRING.
    - FIG. 6300 A. CLASS 125, CAST IRON BODY, HORIZONTAL SWING.
  - GATE, FIG. 6020 A. CLASS 125, CAST IRON BODY, NON-RISING STEM.
  - GLOBE, FIG. 6200 A. CLASS 125, CAST IRON BODY, RENEWABLE SEAT, BRONZE MOUNTED.



ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET



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PLUMBING SPECIFICATION

**P2.2**

JOB NO. 20Y007.01

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4. INSTALL HANGERS AND SUPPORTS TO PROVIDE THE INDICATED PIPE SLOPES, AND SO THAT MAXIMUM PIPE DEFLECTIONS ALLOWED BY ANSI B31 ARE NOT EXCEEDED. COMPLY WITH THE FOLLOWING INSTALLATION REQUIREMENTS:
- a. CLAMPS: ATTACH CLAMPS, INCLUDING SPACERS (IF ANY), TO PIPING OUTSIDE THE INSULATED PIPING SUPPORT. DO NOT EXCEED PIPE STRESSES ALLOWED BY ANSI B31.
- b. INSULATED PIPE SUPPORTS: INSULATED PIPE SUPPORTS SHALL BE SUPPLIED AND INSTALLED ON ALL INSULATED PIPE AND TUBING.
- c. LOAD RATING: ALL INSULATED PIPE SUPPORTS SHALL BE LOAD RATED BY THE MANUFACTURER BASED UPON TESTING AND ANALYSIS IN CONFORMANCE WITH ASME B31.1, MSS SP-58, MSS SP-69 AND MSS SP-89.
- d. SUPPORT TYPE: MANUFACTURER'S RECOMMENDATIONS, HANGER STYLE AND LOAD SHALL DETERMINE SUPPORT TYPE.
- B. PIPE HANGERS AND SUPPORTS:
1. VERTICAL SPACING: SUPPORT AT BASE, EVERY FLOOR HEIGHT NOT EXCEEDING 10 FEET AND REQUIRED BY CODE AND JUST BELOW ROOF LINE.
2. SCREWED OR WELDED STEEL OR COPPER PIPING: MAXIMUM HANGER SPACING SHALL BE AS FOLLOWS:
- |                          | STEEL        | COPPER       |
|--------------------------|--------------|--------------|
| 1-1/4 INCHES AND SMALLER | 6 FOOT SPAN  | 5 FOOT SPAN  |
| 1-1/2 INCH PIPE          | 9 FOOT SPAN  | 6 FOOT SPAN  |
| 2 INCH PIPE              | 10 FOOT SPAN | 10 FOOT SPAN |
3. CAST IRON SOIL PIPE:
- a. HUBLESS AND COMPRESSION JOINT: AT EVERY OTHER JOINT EXCEPT WHEN DEVELOPED LENGTH EXCEEDS 4 FEET, THEN AT EACH JOINT.
- b. ADDITIONAL SUPPORT: PROVIDE AT EACH HORIZONTAL BRANCH AND/OR AT CONCENTRATED LOADS TO MAINTAIN ALIGNMENT AND PREVENT SAGGING.
4. INSTALL ADDITIONAL HANGERS OR SUPPORTS AT CONCENTRATED LOADS SUCH AS PUMPS, VALVES, ETC. TO MAINTAIN ALIGNMENT AND PREVENT SAGGING.
5. INSTALL HANGERS TO PROVIDE MINIMUM 1/2 INCH SPACE BETWEEN FINISHED COVERING AND ADJACENT WORK.
6. PLACE A HANGER WITHIN 12 INCHES OF EACH HORIZONTAL ELBOW.
7. SUPPORT ROD: HANGER SUPPORT RODS SIZED AS FOLLOWS:
- | PIPE SIZE            | ROD DIAMETER | MAX. LOAD |
|----------------------|--------------|-----------|
| 2 INCHES AND SMALLER | 3/8 INCH     | 610 LB.   |
| 2-1/2 TO 3 INCHES    | 1/2 INCH     | 1130 LB.  |
| 4 INCHES             | 5/8 INCH     | 1810 LB.  |
- C. ADJUST HANGERS AND SUPPORTS TO BRING PIPING TO PROPER LEVELS AND ELEVATIONS.
- D. PROVIDE ALL NECESSARY STRUCTURAL ATTACHMENTS SUCH AS ANCHORS, BEAM CLAMPS, HANGER FLANGES AND BRACKETS IN ACCORDANCE WITH MSS SP-69. ATTACHMENTS TO BEAMS WHEREVER POSSIBLE. SUPPORTS SUSPENDED FROM OTHER PIPING, EQUIPMENT, METAL DECKING, ETC., ARE NOT ACCEPTABLE.
- E. HORIZONTAL BANKS OF PIPING MAY BE SUPPORTED ON COMMON STEEL CHANNEL MEMBER SPACED NOT MORE THAN THE SHORTEST ALLOWABLE SPAN REQUIRED ON THE INDIVIDUAL PIPE. MAINTAIN PIPING AT ITS RELATIVE LATERAL POSITION USING CLAMPS OR CLIPS. ALLOW LINES SUBJECT

#### 15260 MECHANICAL INSULATION

#### PART 1 - GENERAL

- 1.1 WORK INCLUDED
- A. PROVIDE PIPING, DUCTWORK AND EQUIPMENT INSULATION INCLUDING JACKETING, ADHESIVE AND ALL RELATED ACCESSORIES FOR COMPLETE INSULATED SYSTEM.
- 1.2 QUALITY ASSURANCE
- A. APPLICATOR: COMPANY SPECIALIZING IN PIPING INSULATION APPLICATION WITH THREE YEARS MINIMUM EXPERIENCE.
- B. INSULATION, JACKET AND ALL RELATED MATERIALS: FLAME SPREAD RATING OF 25 AND SMOKE DEVELOPED RATING OF 50.
- C. CODES: COMPLY WITH ALL APPLICABLE CODES.
- D. INSTALLATION: INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- 1.3 SUBMITTALS
- A. SUBMIT PRODUCT DATA AND INSTALLATION INSTRUCTIONS UNDER PROVISIONS OF SECTION 15010.
- B. INCLUDE PRODUCT DESCRIPTION, LIST OF MATERIALS AND THICKNESS FOR EACH SERVICE, AND LOCATIONS.
- 1.4 DELIVERY, STORAGE AND HANDLING
- A. STORE INSULATION IN ORIGINAL SHIPPING CONTAINER WITH LABELING IN PLACE. DO NOT INSTALL DAMAGED INSULATION.
- 1.5 FIRE HAZARD CLASSIFICATION
- A. MAXIMUM FIRE HAZARD CLASSIFICATION OF THE COMPOSITE INSULATION TO BE NOT MORE THAN A FLAME SPREAD OF 25, FUEL CONTRIBUTED OF 50 AND SMOKE DEVELOPED OF 50 AS TESTED BY ASTM E84, NFPA 255 AND UL 723 METHOD.
- B. TEST PIPE INSULATION IN ACCORDANCE WITH THE REQUIREMENTS OF UL "PIPE AND EQUIPMENT COVERINGS R5583 400 8.15.", ASTM C1136 AND ASTM C547.
- C. TEST DUCT INSULATION IN ACCORDANCE WITH ASTM E84 AND ASTM C1071 AND BEAR THE UL LABEL.
- 1.6 LINING MATERIALS
- A. MATERIALS TO BE MOLD, HUMIDITY, AND EROSION RESISTANT SURFACE TO MEET THE REQUIREMENTS OF UL 181.
- 1.7 HANDICAPPED LAVATORY
- A. P-TRAP, HOT AND COLD WATER INSULATED GUARDS. THERMAL CONDUCTIVITY: K = 1.17 BTU/IN/HR. SQ. FT./DEG. PROVIDE ACCESSORIES AS REQUIRED. TRUE BRO INC., MODEL 102, MCGUIRE, PRO WRAP, BROCAR OR ACCEPTED SUBSTITUTE.

#### PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS
- A. INSULATING MANUFACTURERS: JOHNS MANVILLE, KNAUF, ARMSTRONG, OWENS-CORNING, CERTAIN TEED OR ACCEPTED SUBSTITUTE.
- B. ADHESIVE MANUFACTURERS: BENJAMIN FOSTER, 3M, BORDEN, KINGCO OR ARMSTRONG.
- 2.2 PIPING INSULATION, JACKETING AND ACCESSORIES
- A. FIBERGLASS PIPE INSULATION:
4. PIPING SYSTEMS 55 TO 600 DEG. F: GLASS FIBER PREFORMED PIPE INSULATION WITH A MINIMUM K-VALUE OF 0.23 AT 75 DEG. F, A MINIMUM DENSITY OF 3.5 POUNDS PER CUBIC FOOT.
- B. JACKETS:
1. INTERIOR APPLICATIONS:
- a. VAPOR BARRIER JACKETS: KRAFT REINFORCED FOIL OR VINYL VAPOR BARRIER WITH SELF-SEALING ADHESIVE JOINTS OR PRESSURE SENSITIVE SEAL.
- b. PVC JACKETS: ONE PIECE, PREMOLDED TYPE. "
- C. ACCESSORIES:
1. INSULATION BANDS: 3/4 INCH WIDE; 16 GAUGE STAINLESS STEEL.
2. METAL JACKET BANDS: 0.25 THICK STAINLESS STEEL.
3. INSULATING CEMENT: ANSI/ASTM C195; HYDRAULIC SETTING MINERAL WOOL.
4. FINISHING CEMENT: ASTM C449.
5. FIBROUS GLASS CLOTH: UNTREATED; 9 OZ/SQ YD (305 G/SQ M) WEIGHT.

- 2.3 DUCT INSULATION AND JACKETS
- A. DUCT WRAP: 2 INCH FLEXIBLE GLASS FIBER; ANSI/ASTM C612; COMMERCIAL GRADE; 'K' VALUE OF 0.27 AT 75 DEGREES F.
- B. JACKETING AND FASTENERS:
1. INDOOR JACKET: FOIL-SKRIM-KRAFT.
2. LAGGING ADHESIVE: FIRE RESISTIVE TO ASTM E84, NFPA 255, AND UL 723.
3. IMPALE ANCHORS: GALVANIZED STEEL, 12 GAUGE, SELF-ADHESIVE PAD.
4. JOINT TAPE: GLASS FIBER CLOTH, OPEN MESH.
5. TIE WIRE: ANNEALED STEEL, 16 GAUGE (1.5 MM).
- 2.4 PIPE FITTING INSULATION COVERS
- A. PVC PREFORMED MOLDED INSULATION COVERS. ZESTON OR ACCEPTED SUBSTITUTE.
- 2.5 DUCT INSULATION ACCESSORIES
- A. STAPLES, BANDS, WIRES, TAPE, ANCHORS, AND ACCESSORIES AS RECOMMENDED BY INSULATION MANUFACTURER.
- 2.6 DUCT INSULATION COMPOUNDS
- A. CEMENTS, ADHESIVES, COATINGS, SEALERS, FINISHES AND ACCESSORIES AS RECOMMENDED BY INSULATION MANUFACTURER.

#### PART 3 - EXECUTION

- 3.1 PREPARATION
- A. INSTALL MATERIALS AFTER PIPING, DUCTWORK AND EQUIPMENT HAS BEEN TESTED AND APPROVED.
- 3.2 PIPING INSULATION INSTALLATION
- A. INSTALL MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- B. CONTINUE INSULATION WITH VAPOR BARRIER THROUGH PENETRATIONS.
- C. IN EXPOSED PIPING, LOCATE INSULATION AND COVER SEAMS IN LEAST VISIBLE LOCATIONS. PROVIDE AN INSERT, NOT LESS THAN 6 INCHES LONG, OF SAME THICKNESS AND CONTOUR AS ADJOINING INSULATION, BETWEEN SUPPORT SHIELD AND PIPING, BUT UNDER THE FINISH JACKET, ON PIPING 2 INCHES DIAMETER OR LARGER, TO PREVENT INSULATION FROM SAGGING AT SUPPORT POINTS. INSERTS SHALL BE CORK OR OTHER HEAVY DENSITY INSULATING MATERIAL SUITABLE FOR THE PLANNED TEMPERATURE RANGE. FACTORY FABRICATED INSERTS MAY BE USED.
- E. NEATLY FINISH INSULATION AT SUPPORTS, PROTRUSIONS, AND INTERRUPTIONS.
- F. JACKETS:
1. INDOOR APPLICATIONS: INSULATED PIPES CONVEYING FLUIDS ABOVE AMBIENT TEMPERATURE SHALL HAVE STANDARD JACKETS, WITH VAPOR BARRIER, FACTORY-APPLIED OR FIELD APPLIED. INSULATE FITTINGS, JOINTS, AND VALVES WITH INSULATION OF LIKE MATERIAL AND THICKNESS AS ADJOINING PIPE, AND FINISH WITH GLASS CLOTH AND ADHESIVE.
- G. PIPING INSULATION SCHEDULE:
- | PIPING                                  | PIPE SIZE      | INSULATION        |
|---|----------------|-------------------|
| DOMESTIC COLD                           | ALL            | 1/2" FIBERGLASS   |
| DOMESTIC HOT/TEMPERED AND RECIRCULATING | 2" AND SMALLER | 1-1/2" FIBERGLASS |
- H. PIPE FITTINGS:
1. INSULATE AND FINISH ALL FITTINGS INCLUDING VALVE BODIES, BONNETS, UNIONS, FLANGES AND EXPANSION JOINTS WITH PRECUT FIBERGLASS INSULATION AND PREFORMED PVC COVERS SEALED TO ADJACENT INSULATION JACKET FOR CONTINUOUS VAPOR BARRIER COVERING OVER ALL FITTINGS.
- I. PIPING INSULATION LAP SEAMS AND BUTT JOINTS: INSTALL INSULATION JACKET IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION. WHERE JACKET JOINT AND LAP SEAMS HAVE NOT ADHERED, REMOVE AFFECTED SECTION OF INSULATION AND REINSTALL. WHERE PIPING IS INSTALLED IN THE EXTERIOR BUILDING ENVELOPE OR IN ANY COMPONENT OF THE EXTERIOR BUILDING ENVELOPE IT SHALL BE LOCATED ON THE WARM BUILDING INTERIOR SIDE OF THE BUILDING ENVELOPE INSULATION.
- 3.3 DUCTWORK INSULATION INSTALLATION
- A. INSTALL MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- B. INSTALLATION:
- C. BUTT INSULATION JOINTS FIRMLY TOGETHER AND INSTALL JACKETS AND TAPES SECURELY.
- D. APPLY DUCT INSULATION CONTINUOUSLY THROUGH SLEEPS AND OPENINGS. APPLY VAPOR BARRIER MATERIALS TO FORM A VAPOR SEAL OVER THE INSULATION.
- E. COVER BREAKS IN THE JACKET MATERIAL WITH PATCHES OF THE SAME MATERIAL AS THE VAPOR BARRIER. EXTEND THE PATCHES 2-INCHES BEYOND THE BREAK IN ALL DIRECTIONS AND SECURE WITH ADHESIVE.
- F. SEAL INSULATION TERMINATIONS AND PIN PUNCTURES WITH A REINFORCED VAPOR BARRIER COATING.
- G. CONTINUE INSULATION AT FIRE DAMPERS UP TO AND INCLUDING THOSE PORTIONS OF THE FIRE DAMPER FRAME WHICH ARE VISIBLE AT THE OUTSIDE OF THE RATED BARRIER.
- H. DO NOT CONCEAL DUCT ACCESS DOORS WITH INSULATION.
- I. DUCT WRAP: COVER SUPPLY AIR DUCTS EXCEPT DUCTS INTERNALLY LINED OR WHERE FIBERGLASS DUCTBOARD IS UTILIZED. WRAP TIGHTLY WITH ALL CIRCUMFERENTIAL JOINTS BUTTED AND LONGITUDINAL JOINTS OVERLAPPED MINIMUM OF 2-INCH. ADHERE INSULATION WITH 4-INCH STRIPS OF INSULATING BENDING ADHESIVE AT 8-INCH ON CENTER. ON DUCTS OVER 24-INCH WIDE, ADDITIONALLY SECURE INSULATION WITH SUITABLE MECHANICAL FASTENERS AT 18-INCH ON CENTER. CIRCUMFERENTIAL AND LONGITUDINAL JOINTS STAPLED WITH FLARE STAPLES 6-INCH ON CENTER AND COVERED WITH 3-INCH WIDE FOIL REINFORCED TAPE.
- J. CONTINUE INSULATION WITH VAPOR BARRIER THROUGH PENETRATIONS.
- 3.4 DUCTWORK SURFACES TO BE INSULATED
- | DUCTWORK          | DUCT SIZE | INSULATION THICKNESS |
|-------------------|-----------|----------------------|
| SUPPLY AND RETURN | ALL       | 2" DUCT WRAP         |

#### 15400 PLUMBING

#### PART 1 - GENERAL

- 1.1 WORK INCLUDED
- A. THE REQUIREMENT OF THIS SECTION APPLIES TO THE PLUMBING SYSTEM.
- 1.2 QUALITY ASSURANCE
- A. CODES: SECTION 15010.
- B. FIXTURES: BY SAME MANUFACTURER FOR EACH PRODUCT SPECIFIED THROUGHOUT. COLOR SHALL BE WHITE UNLESS INDICATED OTHERWISE.
- C. TRIM: BY SAME MANUFACTURER FOR EACH PRODUCT SPECIFIED THROUGHOUT.
- 1.3 SUBMITTALS
- A. SUBMIT PRODUCT DATA UNDER PROVISIONS OF SECTION 15010.
- B. INCLUDE FIXTURES, SIZES, UTILITY SIZES, TRIM, AND FINISHES.
- C. SUBMIT FOR:
1. ALL FIXTURES.
2. DRAINS.
- 1.4 PLUMBING FIXTURES
- A. GENERAL: PROVIDE FACTORY FABRICATED FIXTURES OF TYPE, STYLE AND MATERIAL INDICATED ON THE PLUMBING FIXTURE CONNECTION SCHEDULE. FOR EACH TYPE FIXTURE, PROVIDE MANUFACTURER'S STANDARD TRIM, CARRIER, SEATS AND VALVES AS SCHEDULED OR AS RECOMMENDED BY MANUFACTURER AS REQUIRED FOR COMPLETE INSTALLATION.
1. FIXTURES: COMPLETE WITH FITTINGS, SUPPORTS, FASTENING DEVICES, FAUCETS, VALVES, TRAPS, STOPS AND ADDITIONAL DEVICES REQUIRED.
2. EXPOSED IPS PIPING AND TUBING: BRASS, CHROME PLATED.
3. ESCUTCHEONS: BRASS, CHROME PLATED.
4. FIXTURES LOCATIONS: AS SHOWN ON ARCHITECTURAL DRAWINGS.
5. STOPS: STOPS INSTALLED ON EACH SUPPLY PIPE AT EACH FIXTURE ACCESSIBLY LOCATED WITH WALL ESCUTCHEONS.
6. SHOWERS, PUBLIC LAVATORIES, INTERIOR FAUCETS: PROVIDE WITH FLOW CONTROL DEVICE PER CODE.

- 1.5 OPERATION AND MAINTENANCE DATA
- A. SUBMIT OPERATION AND MAINTENANCE DATA UNDER PROVISIONS OF SECTION 15010.

#### PART 2 - PRODUCTS

- 2.1 INTERIOR PLUMBING MATERIALS
- A. CLEANOUTS:
1. MANUFACTURER: J.R. SMITH, JONESPEC, ZURN, WADE, OR ACCEPTED SUBSTITUTE.
2. TYPES:
- a. TILE FLOOR CLEANOUTS: SMITH 4053-U WITH SQUARE HEAVY-DUTY NICKEL BRONZE TOP, TAPER THREAD, BRONZE PLUG, AND VANDALPROOF SCREWS.
- b. CARPETED FLOOR CLEANOUT: SMITH 4023-U-X WITH ROUND HEAVY-DUTY NICKEL BRONZE TOP, TAPER THREAD, BRONZE PLUG, CARPET CLAMPING DEVICE AND VANDALPROOF SCREWS.
- c. CONCRETE FLOOR CLEANOUT: SMITH 4023-U WITH ROUND HEAVY-DUTY NICKEL BRONZE TOP, STAINLESS STEEL SHALLOW COVER AND VANDALPROOF SCREWS.
- d. WALL CLEANOUTS: SMITH 4472-U, BRONZE FERRULE WITH RAISED HEAD BRONZE PLUG, STAINLESS STEEL SHALLOW COVER AND VANDALPROOF SCREWS.
- e. OUTSIDE AREA WALKS AND DRIVES: SMITH 4253-U-G WITH GALVANIZED CAST IRON BODY, TOP SECURED WITH VANDALPROOF SCREWS, TAPER THREAD AND BRONZE PLUG. INSTALL IN 18" X 18" X 6" DEEP CONCRETE PAD FLUSH WITH GRADE.
- B. FLASHING: MINIMUM 4# SHEET LEAD; TO EXTEND HORIZONTALLY 10" FROM EDGE OF VENT PENETRATIONS OR RAIN DRAIN BODY AND VERTICALLY 12" MINIMUM UP FROM ROOF TURNED OVER AND DOWN INTO HUB OF VENT OR FINISHED WITH BRONZE CAP PROVIDING COUNTERFLASHING FOR SCREWED PIPE.
- C. TRAPS: PROVIDE TRAPS ON ALL FIXTURES EXCEPT FIXTURES WITH INTEGRAL TRAPS. EXPOSED TRAPS CHROMIUM PLATED CAST BRASS OR 17 GAUGE CHROME PLATED BRASS TUBING. AMERICAN STANDARD, KOHLER, CHICAGO, BRASSKRAFT, EASTMAN, SPEEDWAY, MCGUIRE OR APPROVED SUBSTITUTE.
- D. SUPPLIES AND STOPS: FIRST QUALITY, CHROME PLATED WITH BRASS STEMS. STOPS: LOOSE KEY TYPE. AMERICAN STANDARD, KOHLER, CHICAGO, BRASSKRAFT, EASTMAN, SPEEDWAY, MCGUIRE OR APPROVED SUBSTITUTE.
- 2.2 PRIMING VALVES:
- A. SMITH 2699, WADE, ZURN, PPP OR ACCEPTED SUBSTITUTE. LOCATE IN CLOSETS, UNDER COUNTERS OR IN WALLS BEHIND MILCOR OR ACCESS PANELS AS SPECIFIED IN SECTION 15050. USE COPPER SPECIFIED IN SECTION 15060 FOR ALL UNDERGROUND PRIMING LINES.
- 2.3 PLUMBING FIXTURE MANUFACTURERS
- A. LAVATORIES
1. AMERICAN STANDARD, KOHLER, OR ZURN.
- B. TRIPLE POT SINK
- C. 1. OWNER SUPPLIED
- D. FAUCET FITTINGS.
1. CHICAGO, MOEN, DELTA, SYMMONS, T&S BRASS OR ACCEPTED SUBSTITUTE.
- E. FOOD PREP SINK.
1. OWNER SUPPLIED.
- F. SERVICE SINK
1. AMERICAN STANDARD, MUSTEE, FIAT OR ACCEPTED SUBSTITUTE.
- G. FLOOR DRAINS
1. CAST IRON BODY, DOUBLE DRAINAGE FLANGE WITH WEEP HOLES, PRIMING CONNECTION, NICKEL BRONZE STRAINER FINISH, FLASHING CLAMP DEVICE, ADJUSTABLE OR INSERT TYPE STRAINER. COMPLY WITH ANSI. SMITH, JOSAM, ZURN OR ACCEPTED SUBSTITUTE.
- 2.4 ELECTRIC WATER HEATER:
- A. ELECTRIC HOT WATER HEATERS:
1. UL APPROVED AND COMPLYING WITH THE STATE ENERGY CODE REQUIREMENTS WITH ADJUSTABLE AUTOMATIC THERMOSTATICALLY CONTROLLED ELECTRIC INSERTION ELEMENTS CONSTRUCTED TO WITHSTAND 400 DEGREES F WITHOUT FAILURE. HEAVY GLASS-LINES STEEL TANK WITH MAGNESIUM ANODE. NOT LESS THAN 1-1/2" OF NON-ORGANIC INSULATION AND FACTORY ENAMELED JACKET. INSTALL WITH ASME CODE PRESSURE-TEMPERATURE RELIEF VALVE AND HOSE BIB DRAIN. CAPACITY AS SHOWN ON DRAWINGS. INTERNAL FACTORY CIRCUIT FUSING ON ALL HEATERS DRAWING 48 AMPS OR MORE PER CIRCUIT.
2. MANUFACTURERS: STATE, RUUD, RHEEM, BRADFORD WHITE, A.O. SMITH, OR ACCEPTED SUBSTITUTE
- A. GREASE INTERCEPTOR:
1. MODEL: GREAT BASIN™ LOW PROFILE INDOOR SERIES MODEL.
2. DESCRIPTION: SCHIER GREAT BASIN™ LOW PROFILE HYDROMECHANICAL GREASE INTERCEPTOR MODEL GB-3 SHALL BE LIFETIME GUARANTEED AND MADE IN USA OF SEAMLESS, ROTATIONALLY-MOLDED POLYETHYLENE WITH MINIMUM 3/8" UNIFORM WALL THICKNESS. INTERCEPTOR SHALL BE FURNISHED FOR ABOVE OR BELOW GRADE INSTALLATION. INTERCEPTOR SHALL BE BUILT IN ACCORDANCE TO ASME A112.14.3 (TYPE C) AND CSA B481.1, WITH FIELD CUT RISER SYSTEM, BUILT-IN FLOW CONTROL, BUILT IN TEST/SEALING CAPS AND THREE OUTLET OPTIONS. INTERCEPTOR FLOW RATES SHALL BE 75 GPM. INTERCEPTOR GREASE CAPACITIES SHALL BE 175.6 LBS. AT 75 GPM. COVER SHALL PROVIDE WATER/GAS TIGHT SEAL AND HAVE MINIMUM 450 LBS. LOAD CAPACITY. PROVIDE 12" RISER IF REQUIRED.

#### PART 3 - EXECUTION

- 3.1 INSPECTION
- D. REVIEW MILLWORK SHOP DRAWINGS. CONFIRM LOCATION AND SIZE OF FIXTURES AND OPENINGS BEFORE ROUGH-IN AND INSTALLATION.
- E. VERIFY ADJACENT CONSTRUCTION IS READY TO RECEIVE ROUGH-IN WORK OF THIS SECTION.
- F. C. REVIEW ROUGH-IN LOCATIONS OF POTABLE WATER AND WASTE PIPING SYSTEMS TO VERIFY ACTUAL LOCATIONS PRIOR TO INSTALLING FIXTURES.
- 3.2 INSTALLATION
- A. INSTALL EACH FIXTURE WITH TRAP, EASILY REMOVABLE FOR SERVICING AND CLEANING.
- B. INSTALL COMPONENTS LEVEL AND PLUMB.
- C. INSTALL AND SECURE FIXTURES IN PLACE WITH WALL CARRIERS AND BOLTS. INSTALL FIXTURES AS SHOWN ON DRAWINGS.
1. SUPPORT ALL WALL HUNG WATER CLOSETS AND URINALS ON HEAVY DUTY, CONCEALED, CHAIR CARRIERS MOUNTED TO FLOOR STRUCTURE.
2. SUPPORT WALL HUNG LAVATORIES MOUNTED ON STUD PARTITIONS ON HEAVY CONCEALED WALL BRACKETS BOLTED TO A STEEL PLATE ANCHORED FIRMLY TO STUDS WITH BOLTS. PLATE TO EXTEND ONE STUD EACH WAY BEYOND FIXTURE MOUNTING POINT WIDTH. FLOOR MOUNTED CONCEALED ARM CARRIERS APPROVED.
- D. CLEANOUTS
11. WHERE REQUIRED BY CODE, AT EACH CHANGE OF SEWER DIRECTION 45 DEGREES OR GREATER AND MORE THAN 10' LONG, AT END OF EACH BRANCH OR MAIN AND SPACED NOT GREATER THAN 100' APART, AS REQUIRED BY CODE AND/OR AS SHOWN ON DRAWINGS.
- E. INSTALL ALL DEVICES IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND RECOMMENDATIONS.
- F. PROVIDE WASTE PIPING TO PLUMBING FIXTURES AND DRAINS, WITH APPROVED TRAP, OF SIZES INDICATED; BUT IN NO CASE SMALLER THAN REQUIRED BY CODE.
- 3.3 OWNER-FURNISHED EQUIPMENT
- A. ROUGH-IN FOR EQUIPMENT, RECEIVE, INSTALL AND CONNECT ALL PLUMBING EQUIPMENT, FAUCETS AND FIXTURES AS FURNISHED BY OTHERS. FURNISH AND INSTALL ALL STOPS, TRAPS, STRAINERS, BACKFLOW PREVENTERS, VALVES AND OTHER DEVICES NOT FURNISHED BY OTHERS IN ORDER TO PROVIDE A COMPLETE OPERATING SYSTEM.

- G. MECHANICAL EQUIPMENT CONNECTIONS: CONNECT PIPING SYSTEM TO MECHANICAL EQUIPMENT AS INDICATED. COMPLY WITH EQUIPMENT MANUFACTURER'S INSTRUCTIONS. PROVIDE SHUTOFF VALVE AND UNION FOR EACH CONNECTION. PROVIDE DRAIN VALVE ON DRAIN CONNECTION.
- H. ARRANGE LOCATIONS OF VALVES, UNIONS, DRAINS AND OTHER COMPONENTS TO PROVIDE FOR EASE OF MAINTENANCE, REPAIR OR SERVICE. SIZE ACCESS PANELS AND LOCATE TO PROVIDE WORKING SPACES FOR ALL DEVICES SERVED BY ACCESS.
- I. FIXTURES:
1. INSTALL PLUMBING FIXTURES WHERE SHOWN AND AT APPROPRIATE HEIGHTS. IN ACCORDANCE WITH FIXTURE MANUFACTURER'S WRITTEN INSTRUCTIONS, ROUGHING-IN DRAWINGS AND INDUSTRY STANDARDS.
2. SET AND CONNECT TO SOIL, WASTE, VENT AND WATER PIPING IN NEAT, UNIFORM MANNER. CONNECTIONS TO BE PLUMB AND SET AT RIGHT ANGLES TO FLOOR AND WALL UNLESS OTHERWISE REQUIRED.
3. SEAL FIXTURES MOUNTED ON FLOORS AND WALLS WITH SEALANT COMPOUNDS AS DIRECTED BY ARCHITECT.
4. INSTALL HANDLE OF TANK TYPE TOILETS AT WIDE PORTION OF STALL.
5. SET MIXING VALVES OF LAVATORIES TO LIMIT TEMPERATURE TO 110F.
- J. STOPS: SCREWDRIVER OR LOOSE KEY STOPS TO BE INSTALLED IN HOT AND COLD SUPPLY PIPE TO EACH FIXTURE ACCESSIBLY LOCATED.

TENANT IMPROVEMANT FOR:

BSD OAK HILLS ELEMENTARY- TR REMODEL

2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

PLUMBING SPECIFICATION

P2.3

JOB NO. 20Y007.01

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ISSUED DATE

1 03.23.2020 PRELIMINARY DRAWING SET

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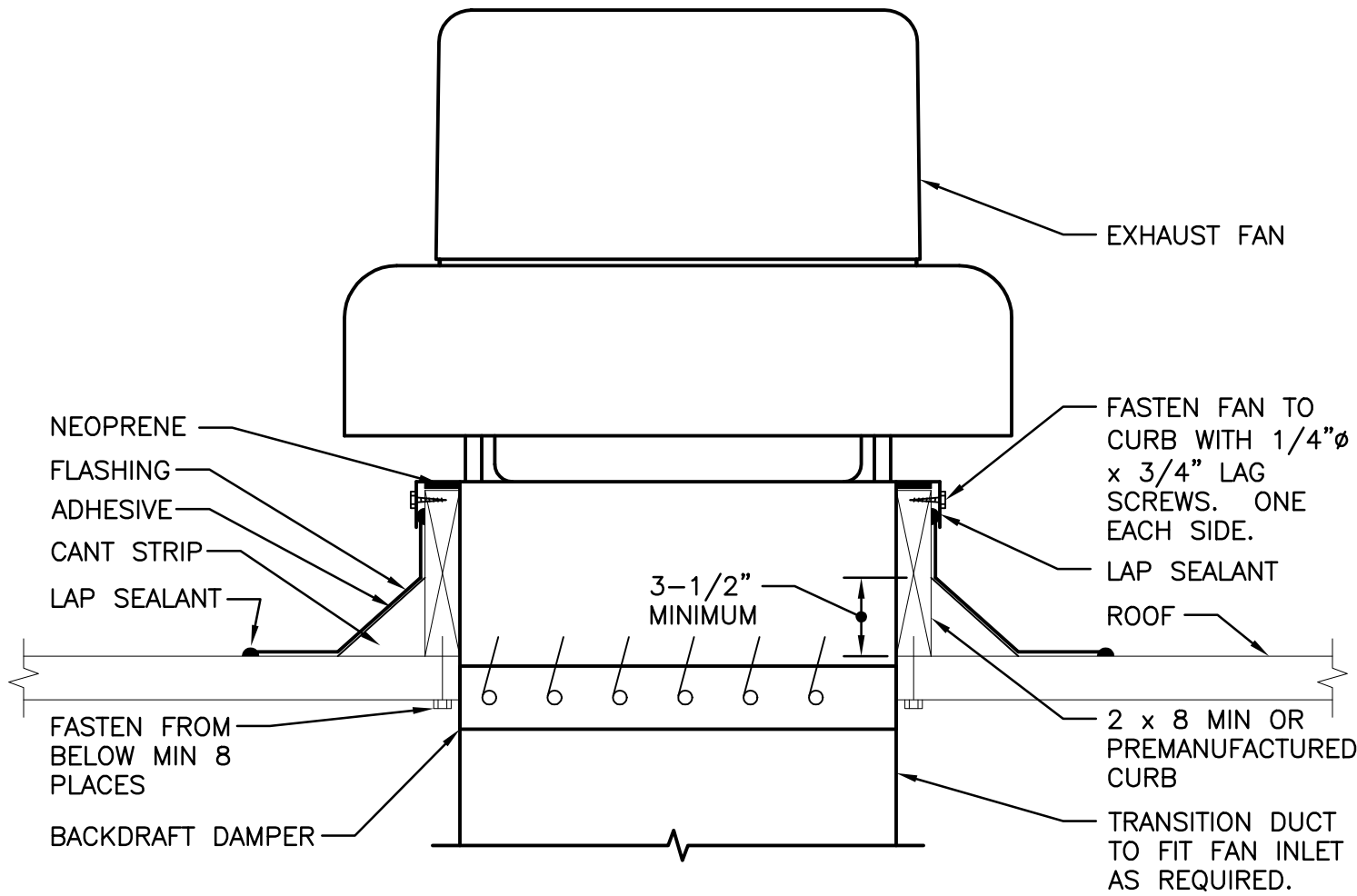
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EXHAUST FAN SCHEDULE	
MARK NUMBER	<div>EF2</div>
SYSTEM	A130/A132
TYPE	ROOF
AIR FLOW (CFM)	225
ESP("H2O)	.5
MOTOR (HP)	1/20
SPEED (RPM)	1500
DISCHARGE	ROOF
INTERLOCK WITH	EXISTING
CONTROLLED BY	EXISTING
BACKDRAFT DAMPER	YES
ROOF CURB	YES
INLET GUARD	YES
ISOLATION TYPE	RUBBER
ELECTRICAL (V-PH)	115-1
DESIGN WEIGHT (LBS)	40
NOTES	1
MANUFACTURER/MODEL	GREENHECK/G-080-D
NOTES: 1. CONNECT TO EXISTING CONTROLS.	



- NOTES
1. IN AREAS WHERE ROOF IS BALLASTED, REMOVE EXISTING BALLAST FROM AROUND OPENING. SURFACE MUST BE CLEAN AND SMOOTH, FREE FROM WATER, OIL AND LOOSE MATERIAL. AFTER INSTALLATION REPLACE BALLAST AROUND FINISHED CURB.
  2. CANT CURB AS REQUIRED FOR LEVEL INSTALLATION.

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M0.1

 ROOF EXHAUST FAN DETAIL  
NOT TO SCALE

MECHANICAL LEGEND		
DUCTWORK FITTINGS (DOUBLE/SINGLE LINE) AND CONTROLS		ABBREVIATIONS
DOUBLE LINE DUCTWORK	SINGLE LINE DUCTWORK	
		SUPPLY AIR ELBOW UP
		RETURN/EXHAUST AIR ELBOW UP
		OUTSIDE AIR ELBOW UP
		SUPPLY AIR ELBOW DOWN
		RETURN/EXHAUST AIR ELBOW DOWN
		OUTSIDE AIR ELBOW DOWN
		FLEXIBLE DUCT
		SQUARE ELBOW
		RADIUS ELBOW
		ACOUSTICALLY LINED DUCT (SIZES SHOWN ARE NET INSIDE)
		TURNING VANE
		SUPPLY AIR DIFFUSER WITH THROW DIRECTION
		SUPPLY AIR SIDEWALL REGISTER
		RETURN/EXHAUST AIR CEILING REGISTER
		RETURN/EXHAUST AIR SIDEWALL REGISTER
	MVD	MANUAL VOLUME DAMPER
	MD	MOTORIZED DAMPER
	FSD	FIRE SMOKE DAMPER
	THERMOSTAT/SENSOR MOUNTED @ 48" AFF WITH UNIT SERVED NOTED	
	VAV-1	

ABBREVIATIONS	
AFF	ABOVE FINISHED FLOOR
BDD	BACKDRAFT DAMPER
BTU	BRITISH THERMAL UNIT
CFM	CUBIC FEET PER MINUTE
(E)	EXISTING
ESP	EXTERNAL STATIC PRESSURE
EXH	EXHAUST AIR
GPM	GALLONS PER MINUTE
HP	HORSEPOWER
MA	MAKE-UP AIR
MBH	1000 BTU PER HOUR
MFR	MANUFACTURER
(N)	NEW
OSA	OUTSIDE AIR
PSI	POUNDS PER SQUARE INCH
RA	RETURN AIR
SA	SUPPLY AIR

REFERENCE	
	CONNECT TO EXISTING AT THIS POINT. VERIFY LOCATION, SIZE, AND CONDITION.
	SHEET NOTE
	EQUIPMENT MARK NUMBER SEE SCHEDULES
	REVISION
	DIFFUSER/REGISTER MARK NUMBER
	NECK SIZE
	SCHEDULED TYPE
	OPPOSED BLADE DAMPER

NOTE: NOT ALL SYMBOLS OR ABBREVIATIONS CONTAINED IN THIS LEGEND WILL APPEAR ON DRAWINGS.



ISSUED DATE	1 03.23.2020 PRELIMINARY DRAWING SET
	2 04.21.2020 PERMIT SET

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TENANT IMPROVEMENT FOR:  
**BSD OAK HILLS ELEMENTARY- TR REMODEL**  
2625 NW 153RD. AVE.  
BEAVERTON, OREGON 97006

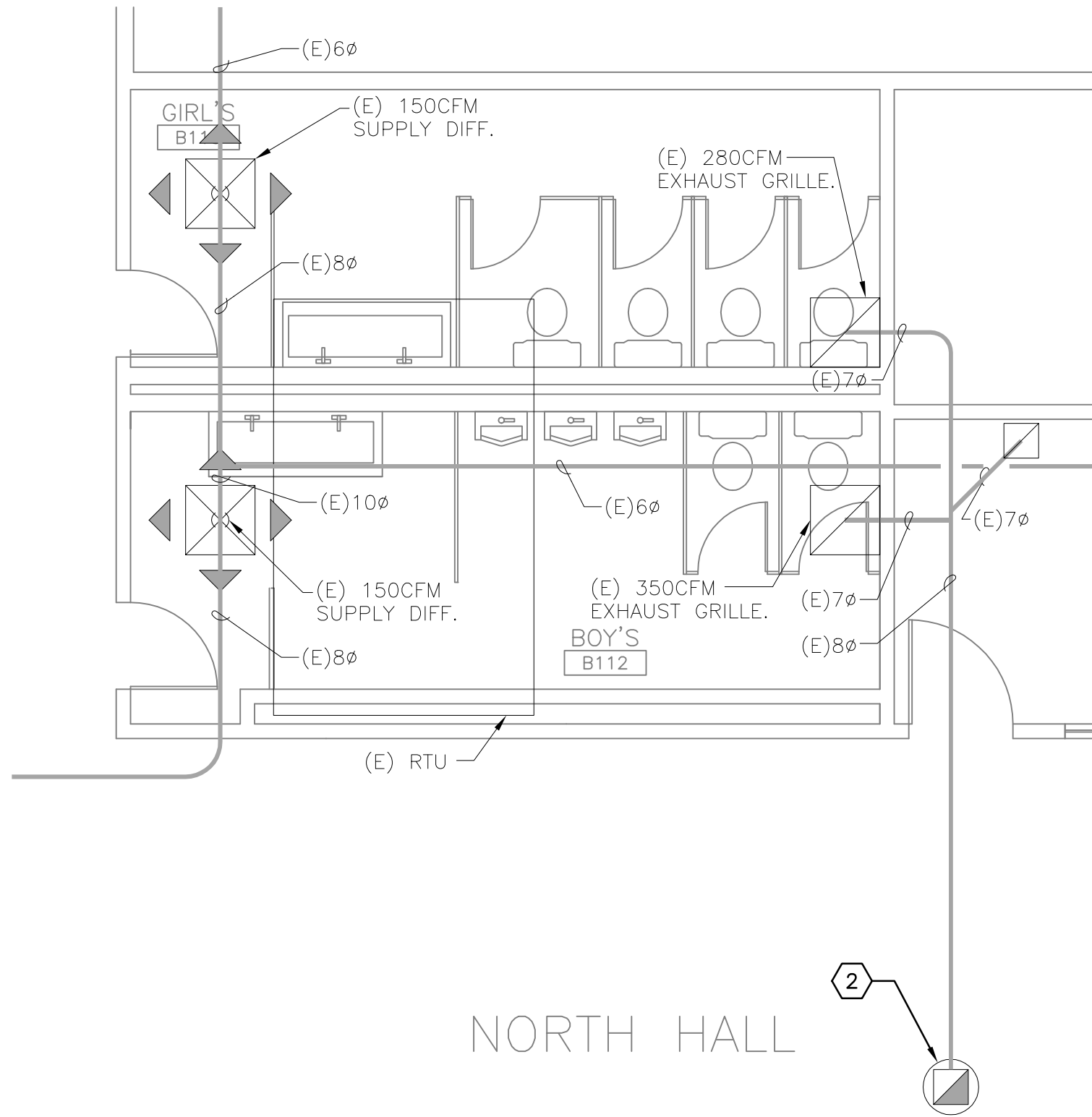
COVER SHEET – HVAC

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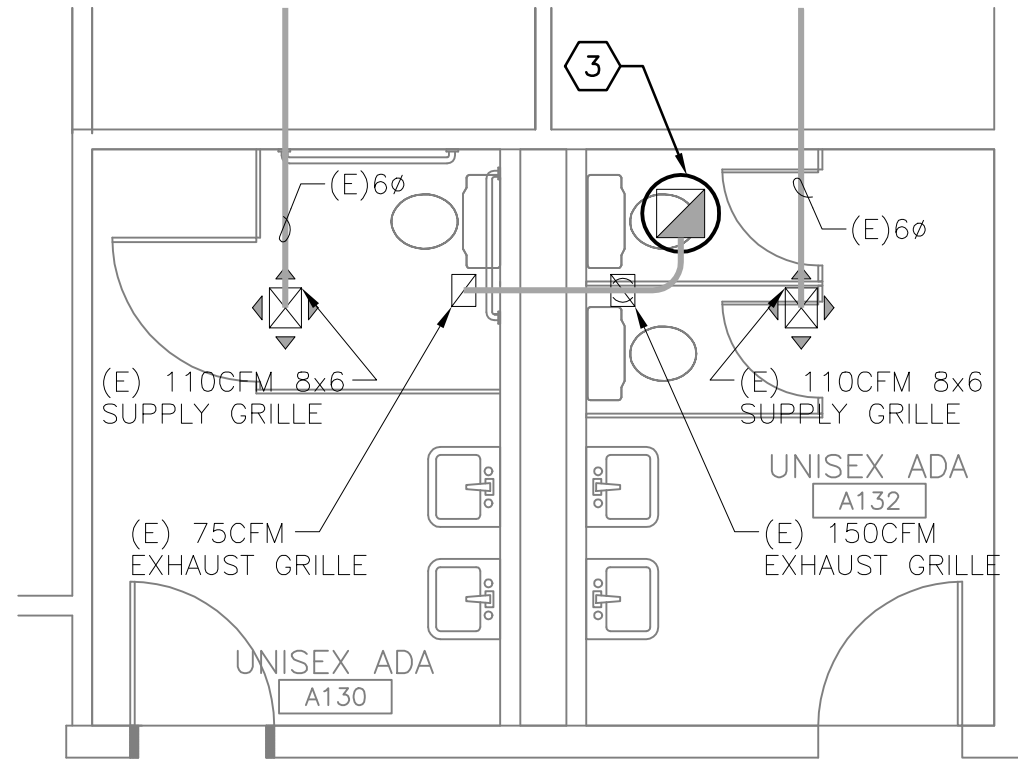
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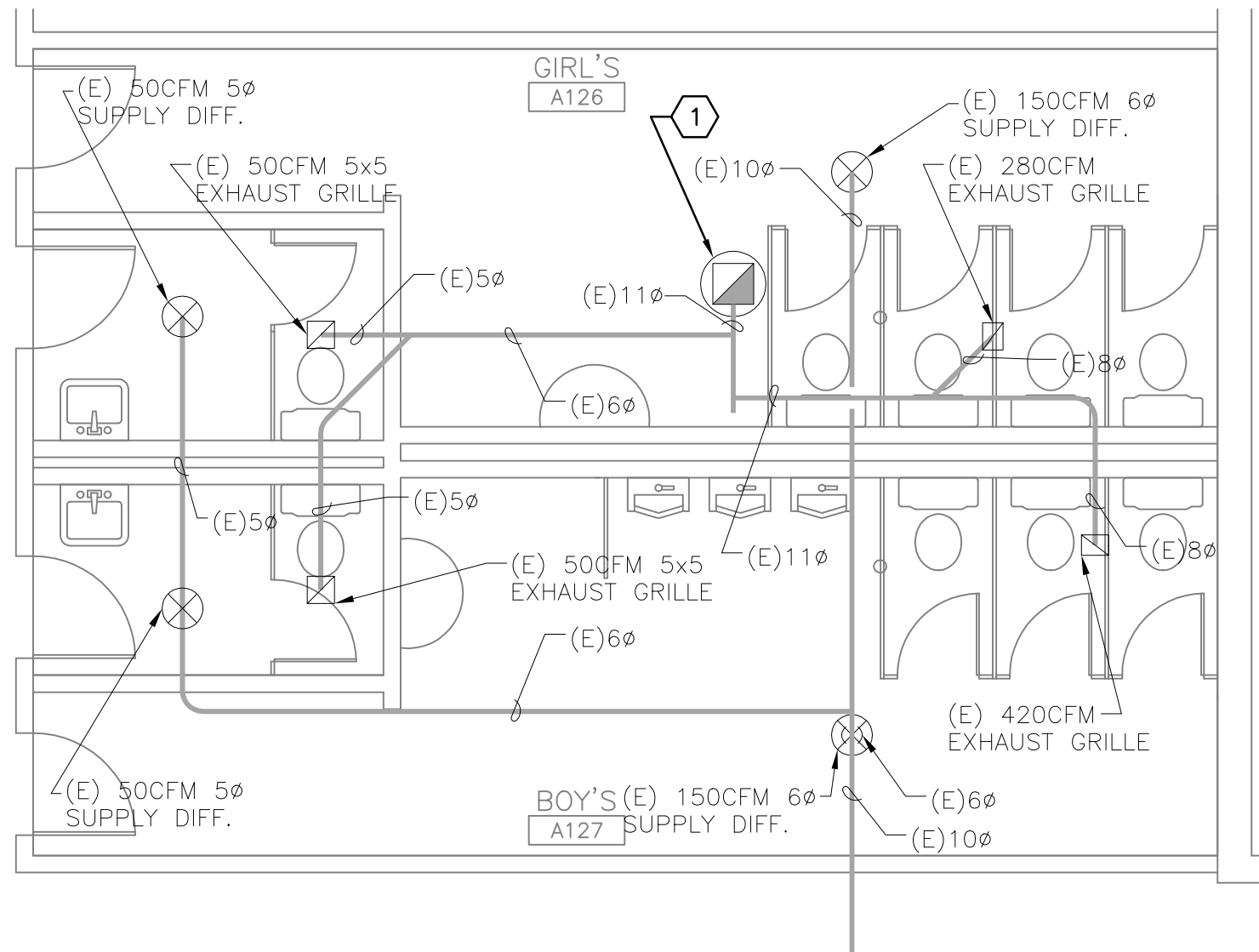
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1 DEMO FLOOR PLAN , B110 & B112 - MECHANICAL  
M1.1 SCALE: 1/4" = 1'-0"



2 DEMO FLOOR PLAN , A130 & A132 - MECHANICAL  
M1.1 SCALE: 1/4" = 1'-0"



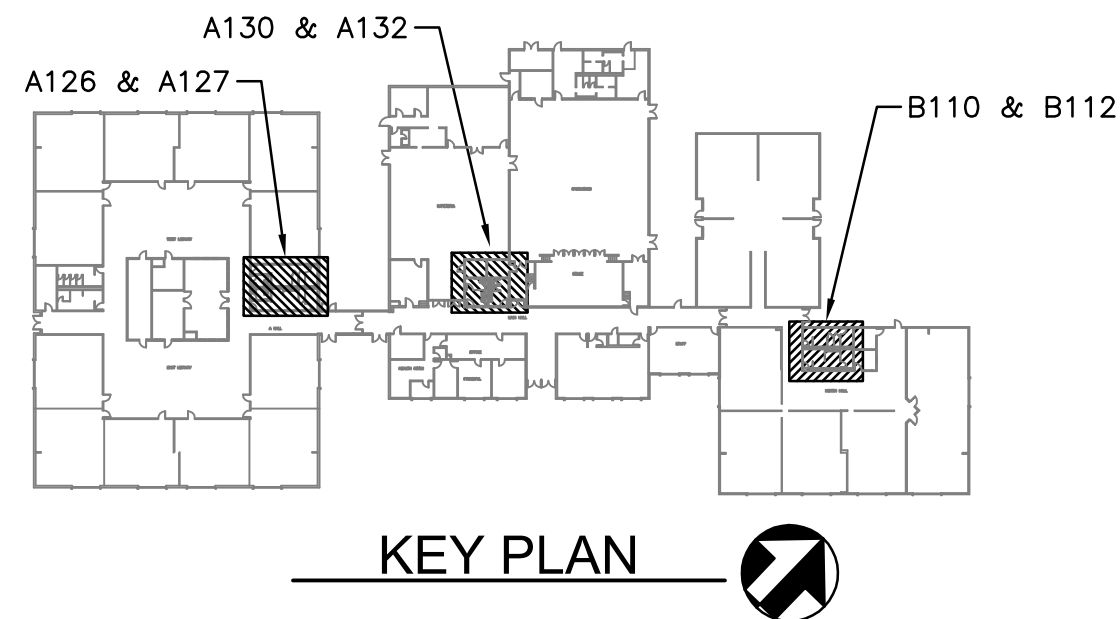
3 DEMO FLOOR PLAN, A126 & A127 - MECHANICAL  
M1.1 SCALE: 1/4" = 1'-0"

## GENERAL NOTES

- A. VERIFY EXISTING CONDITIONS, CONNECTIONS, AND CLEARANCES BEFORE PURCHASING OR INSTALLING EQUIPMENT.

## NOTES THIS SHEET

- 1 2010 INSTALLED, EXISTING ROOF TOP EXHAUST FAN GREENHECK MODEL GB-121-4X-QD SERIAL NUMBER 12171869 1008, SERVING A126 & A127 TO REMAIN.
- 2 2013 INSTALLED, EXISTING ROOF TOP EXHAUST FAN GREENHECK MODEL GB-141-3-X SERIAL NUMBER 13216178 1304, SERVING B110 & B112 TO REMAIN.
- 3 DEMO EXISTING ROOF TOP EXHAUST FAN SERVING RESTROOMS A130 & A132. REMOVE DUCT AS NEEDED TO CONNECT NEW. BLOCK OPENING UNTIL NEW UNIT IS INSTALLED.



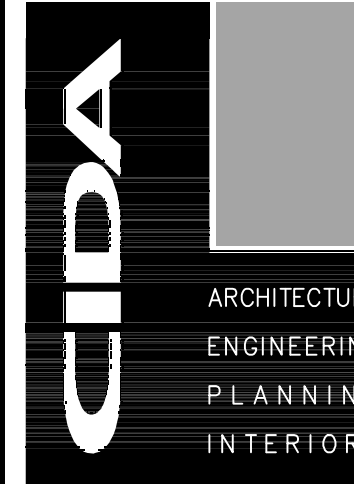
KEY PLAN



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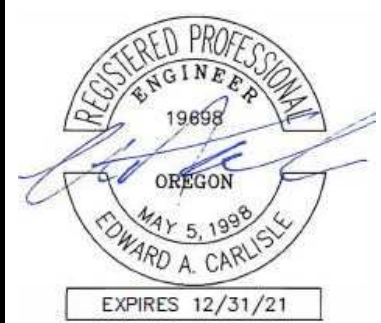
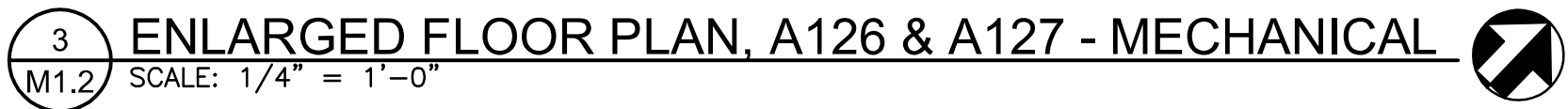
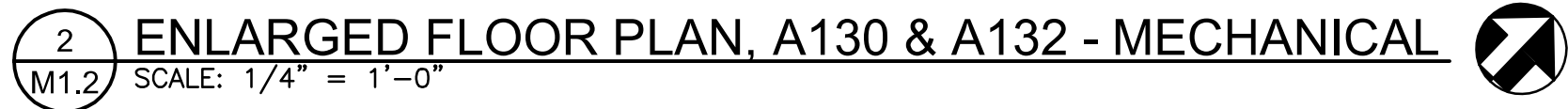
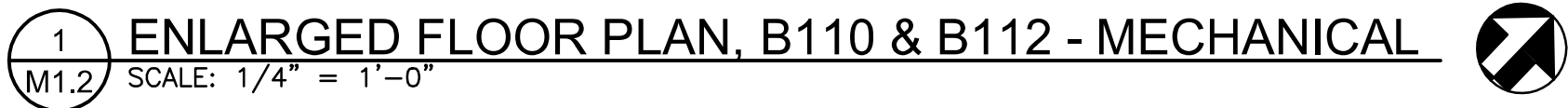
DEMO PLANS - HVAC

**M1.1**

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**B3**

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ENLARGED PLANS –  
HVAC

**M1.2**

JOB NO. 20Y007.01

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DIVISION 15 MECHANICAL SPECIFICATIONS

SEE PLUMBING SHEETS

1 – GENERAL

1.1 WORK INCLUDED

- A. PROVIDE FANS AS SPECIFIED HEREIN AND SHOWN ON THE DRAWINGS.
- 2 – PRODUCTS

2.1 CEILING AND INLINE EXHAUST FANS

- A. DIRECT DRIVE: CEILING MOUNTED CENTRIFUGAL TYPE WITH DIRECT DRIVE MOTOR, INSULATED CABINET, VIBRATION ISOLATORS, BACKDRAFT DAMPER, EXHAUST GRILLE, SPEED CONTROL AND DISCONNECT SWITCH. PENN, GREENHECK, COOK, NUTONE, BROAN OR ACCEPTED SUBSTITUTE.

3 EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. INSTALL IN ACCORDANCE WITH MANUFACTURER’S INSTRUCTIONS AND APPLICABLE CODE.
- B. LUBRICATE ALL MOVING AND ROTATING PARTS IN ACCORDANCE WITH MANUFACTURER’S RECOMMENDATION PRIOR TO START-UP.

SECTION 15890 – AIR DISTRIBUTION

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. PROVIDE AIR DISTRIBUTION EQUIPMENT AS SPECIFIED HEREIN AND SHOWN.
- B. EQUIPMENT CAPACITY AND SIZE SHALL BE AS SHOWN.

1.2 QUALITY ASSURANCE

- A. DUCTWORK: COMPLY WITH REQUIREMENTS OF THE STATE MECHANICAL SPECIALTY CODE (LATEST EDITION).
- 3.1 SUBMITTALS

- A. PROVIDE SUBMITTALS FOR THE FOLLOWING:
  - 1. SPIRAL DUCTWORK.
  - 2. FLEXIBLE DUCTWORK.
  - 3. DAMPERS.
  - 4. GRILLES, REGISTERS AND DIFFUSERS.

PART 2 – PRODUCTS

2.1 DUCTWORK

- A. GALVANIZED STEEL SHEET METAL: METAL GAUGES, JOINTS AND REINFORCEMENT IN ACCORDANCE WITH MECHANICAL CODE, ASHRAE AND SMACNA TABLES AND RECOMMENDATIONS.
- B. SPIRAL SEAM DUCT: ROUND AND FLAT OVAL SPIRAL SEAM DUCT SHALL BE MANUFACTURED OF GALVANIZED STEEL SHEET METAL WITH SPIRAL LOCK SEAM. MATCHING FITTINGS SHALL BE MANUFACTURED OF GALVANIZED STEEL WITH SPOT WELDED SEAMS. UNITED SHEET METAL, SEMCO, ROLOCK, METCO OR ACCEPTED SUBSTITUTE.
- C. VAPOR HOOD EXHAUST DUCT: DUCTS AND PLENUMS SHALL BE CONSTRUCTED OF RIGID ALUMINUM. SEAMS AND JOINTS SHALL BE SEALED IN A WATER-TIGHT MANNER AND FASTENED WITH NON-FERROUS FASTENERS. SLOPE DUCTWORK TO DRAIN TOWARD VAPOR HOOD.
- D. FLEXIBLE DUCTWORK: INSULATED LOW PRESSURE FLEXIBLE DUCT, FACTORY FABRICATED ASSEMBLY CONSISTING OF A ZINC COATED SPRING STEEL HELIX, SEAMLESS INNER LINER, WRAPPED WITH A NOMINAL ONE INCH THICK, ONE POUND PER CUBIC FOOT DENSITY FIBERGLASS INSULATION. THE ASSEMBLY SHALL BE SHEATHED IN A VAPOR BARRIER JACKET, FACTORY SEALED AT BOTH ENDS OF EACH SECTION ASSURING THE VAPOR RESISTANCE OF EACH SECTION AS WELL AS THE COMPLETED INSTALLATION. THE COMPOSITE ASSEMBLY, INCLUDING INSULATION AND VAPOR BARRIER, SHALL MEET THE CLASS I REQUIREMENTS OF NFPA 90A AND BE LABELED BY UL WITH A FLAME SPREAD RATING OF 25 OR LESS AND A SMOKE DEVELOPED RATING OF 50 OR UNDER. THE DUCT SHALL HAVE FACTORY SEALED DOUBLE AIR SEAL (INTERIOR AND EXTERIOR), TO ASSURE AN AIRTIGHT INSTALLATION. GENFLEX, WIREMOLD, THERMAFLEX OR ACCEPTED SUBSTITUTE.
- E. STAINLESS STEEL DUCT: ASTM A167 AND A480, TYPE 304.

2.2 ACOUSTICAL DUCT LINING

- A. LINE DUCTS WITH 1 INCH THICK, JOHNS MANVILLE "PERMACOTE LINACOUSTIC" R–300, MEETING NFPA 90A REQUIREMENTS FOR MAXIMUM FLAME SPREAD AND SMOKE DEVELOPED. GUSTIN BACON, OWENS CORNING OR ACCEPTED SUBSTITUTE. AIR SIDE SURFACE PROTECTED WITH ACRYLIC COATING, IMPERVIOUS TO DUST AND DIRT, WILL NOT SUPPORT MICROBIAL GROWTH, RATED FOR 5,000 FPM AIR VELOCITY. MECHANICALLY ATTACH LINING TO SHEET METAL DUCT WITH JOHNS MANVILLE GRIP NAILS OR GRAMWELD WELDING PINS. APPLY FIRE RETARDANT TYPE ADHESIVE SIMILAR TO JOHNS MANVILLE NO. 44 ADHESIVE, BENJAMIN FOSTER 81–99, INSUL–COUSTIC 22 OR 3M EQUIVALENT ON ALL LEADING EDGES, JOINTS AND SEAMS.

2.3 DUCT SEALING

- A. ALUMINUM BONDED TO ALUMINIZED MYLAR REINFORCED WITH FIBERGLASS MESH BACKING AN ELASTOMERIC PRESSURE SENSITIVE ADHESIVE SPECIFICALLY FORMULATED FOR ADHESION TO GALVANIZED METAL. HARDCAST "AFG–1402" WITH "HD–181" DEGREASER OR ACCEPTED SUBSTITUTE.
- B. TWO–PART SEALING SYSTEM WITH WOVEN FIBER, MINERAL GYPSUM IMPREGNATED TAPE AND NON–FLAMMABLE ADHESIVE. HARDCAST "DT–5300 TAPE AND "RTA–50" ADHESIVE OR UNITED "UNI–CAST" SYSTEM OR ACCEPTED SUBSTITUTE.
- C. DUCT JOINTS FOR SHEET METAL DUCTS: "DUCTMATE SYSTEM" BY DUCTMATE INDUSTRIES, INC., FOR MAKING TRANSVERSE RECTANGULAR AND ROUND DUCT JOINTS. WARD DUCT CONNECTORS, INC., MEZ, LOCKFORMER TDC OR ACCEPTED SUBSTITUTES.

2.4 ACCESSORIES

- A. MANUAL VOLUME DAMPERS: CONSTRUCT OF MATERIAL TWO GAUGES HEAVIER THAN DUCT IN WHICH INSTALLED; SINGLE PLATE UP TO 12 INCHES WIDE; MULTIPLE OVER 12 INCHES WIDE. HEM BOTH EDGES 1/2 INCH AND FLANGE SIDES 1/2 INCH. PROVIDE REGULATOR EXTENSION THROUGH SHEET ROCK CEILING WITH CONCEALED ADJUSTABLE COVER. USE YOUNG, DURODYNE OR ACCEPTED SUBSTITUE DAMPER ACCESSORIES.
- B. BACKDRAFT DAMPERS: CONNECTED, FELT–EDGED ALUMINUM BLADES SET IN 14 GAUGE OR HEAVIER STEEL FRAME, BRASS, NYLON OR TEFLON BEARINGS; EQUIP WITH SPRING HELPER WITH TENSION ADJUSTMENT FEATURE OR WITH ADJUSTABLE COUNTERWEIGHT AND ADJUST TO OPEN WHEN NOT MORE THAN 0.10 INCH WG PRESSURE IS APPLIED. RUSKIN CBD–4, PACIFIC AIR PRODUCTS, AIR BALANCE, CONTROLAIR OR ACCEPTED SUBSTITUTE.
- C. FAN AND AIR HANDLING UNIT FLEXIBLE CONNECTIONS: INSTALL NEOPRENE IMPREGNATED FIBERGLASS CONNECTIONS IN DUCTWORK AT ALL ROTATING EQUIPMENT. VENTGLASS, DURO–DYNE OR ACCEPTED SUBSTITUTE.
- D. CONTROL DAMPERS: PROVIDE AUTOMATIC CONTROL DAMPERS AS INDICATED. AIRFOIL, MULTI–BLADE TYPE WITH A MAXIMUM BLADE WIDTH OF 48 INCHES. BLADES TO BE INTERLOCKING, MINIMUM 16 GAUGE, CONTINUOUS SHAFTS TO PROVIDE FOR "TRACKING" OF ALL BLADES. MAXIMUM AIR LEAKAGE OF 4 CFM PER SQ. FT. AT 1.0 INCHES WATER GAUGE. PROVIDE DAMPER ACTUATOR. ALERTON, HONEYWELL, JOHNSON CONTROL, SEIMENS, TRANE OR ACCEPTED SUBSTITUTE.

2.5 GRILLES, REGISTERS AND DIFFUSERS

- A. DESCRIPTION: PROVIDE GRILLES, REGISTERS AND DIFFUSERS AS SHOWN.
- B. FINISH:
  - 1. STEEL: BAKED–ON WHITE ENAMEL FINISH, OR FLAT WHITE PRIME COAT, FACTORY APPLIED. VERIFY THE EXACT FINISH TYPE WITH ARCHITECTURAL DRAWINGS.
  - 2. ALUMINUM: CLEAR ANODIZED.
- C. MANUFACTURERS: AIR DEVICES, ANEMOSTAT, CARNES, KRUEGER, TUTTLE & BAILEY, PRICE CO., METALARE ARE ACCEPTED SUBSTITUTES WHERE TITUS MODEL NUMBERS ONLY ARE LISTED.

PART 3 – EXECUTION

3.1 LAYOUT AND COORDINATION

- A. SITE EXAMINATION: BEFORE STARTING WORK, CAREFULLY EXAMINE SITE AND ALL CONTRACT DRAWINGS. BECOME THOROUGHLY FAMILIAR WITH CONDITIONS GOVERNING WORK ON THIS PROJECT.
- B. UTILITY LOCATIONS: THE LOCATION OF ALL UTILITIES, WIRES, CONDUITS, PIPES, DUCTS, OR OTHER SERVICE FACILITIES ARE SHOWN IN A GENERAL WAY ONLY ON THE DRAWINGS.

3.2 INSTALLATION

- A. PROVIDE OPENINGS IN DUCTWORK WHERE REQUIRED TO ACCOMMODATE THERMOMETERS AND CONTROLLERS. PROVIDE PILOT TUBE OPENING WHERE REQUIRED FOR TESTING OF SYSTEMS, COMPLETE WITH METAL CAN WITH SPRING DEVICE OR SCREW TO ENSURE AGAINST AIR LEAKAGE. WHERE OPENINGS ARE PROVIDED IN INSULATED DUCTWORK, INSTALL INSULATION MATERIALS INSIDE A METAL RING.
- B. LOCATE DUCTS WITH SUFFICIENT SPACE AROUND EQUIPMENT TO ALLOW NORMAL OPERATING AND MAINTENANCE ACTIVITIES.
- C. PROVIDE MANUAL VOLUME DAMPERS AT POINTS ON LOW PRESSURE SUPPLY, RETURN, AND EXHAUST SYSTEMS WHERE BRANCHES ARE TAKEN FROM LARGER DUCTS FOR AIR BALANCING. USE SPLITTER DAMPERS ONLY WHERE SHOWN. LOCATION OF ALL VOLUME DAMPERS ARE NOT NECESSARILY SHOWN ON THE DRAWINGS.
- D. PROVIDE FLEXIBLE CONNECTIONS IMMEDIATELY ADJACENT TO EQUIPMENT IN DUCTS ASSOCIATED WITH FANS AND MOTORIZED EQUIPMENT.
- E. PROVIDE BACKDRAFT DAMPERS ON EXHAUST FANS OR EXHAUST DUCTS NEAREST TO OUTSIDE AND WHERE SHOWN.
- F. PROVIDE DUCT ACCESS DOORS FOR INSPECTION AND CLEANING BEFORE AND AFTER FILTERS, COILS, FANS, AUTOMATIC DAMPERS, AT FIRE DAMPERS, AND ELSEWHERE AS INDICATED. PROVIDE MINIMUM 12 INCHES X 12 INCHES SIZE FOR HAND ACCESS, 18 INCHES X 24 INCHES SIZE FOR SHOULDER ACCESS AND AS INDICATED. INSTALL NECESSARY ACCESS OPENINGS AND COVERS FOR CLEANING, WIRING OR SERVICING MOTORS, FIRE DAMPERS, FILTERS, FANS, BOTH ENTERING AND LEAVING AIR SIDES OF COILS, AND TO OTHER EQUIPMENT LOCATED WITHIN OR BLOCKED BY DUCTWORK.
- G. SUPPORT: INSTALL DUCTWORK WITH 1 INCH WIDE 16 GAUGE CRADLE HANGERS NOT MORE THAN 8 FEET C/C OR AS REQUIRED BY CODE. SUPPORT TERMINAL UNITS INDEPENDENT OF ADJACENT DUCTWORK. ATTACH TO AVAILABLE BUILDING CONSTRUCTION AS PER GOOD PRACTICES FOR MATERIALS INVOLVED. EXPOSED DUCTWORK SHALL BE SUPPORTED BY CLOSED CRADLE STRAP SUSPENDED FROM 3/8 INCH THREADED ROD.
- H. CONNECTION FITTINGS: ROUND CONNECTIONS TO RECTANGULAR DUCTS MANUFACTURED SHEET METAL "SPIN–IN" FITTINGS. GENFLEX, WIREMOLD, THERMAFLEX, GLASSFLEX, CLEVEPAK, MANVILLE, OR ACCEPTED SUBSTITUTE.
- I. ELBOWS AND FITTINGS: CONSTRUCT ELBOWS WITH THROAT RADIUS EQUAL TO DUCT WIDTH IN PLANE OR TURN OR MAKE THEM SQUARE AND PROVIDE DOUBLE WALL, AIR FOIL TURNING VANES.
- J. FITTINGS: MAKE TRANSITIONS AND TAKE–OFFS AS SHOWN. PROVIDE VOLUME DAMPERS AND SPLITTER DAMPERS AS SHOWN AND AS SPECIFIED.
- K. SLEEVES: PROVIDE GALVANIZED SHEET METAL PLASTER RING AROUND DUCTWORK PENETRATING EXPOSED FINISHED WALLS. SLEEVE AND FLASH ALL DUCT PENETRATIONS THROUGH EXTERIOR WALLS IN AN AIR TIGHT AND WEATHERPROOF MANNER.
- L. PLENUMS: CONSTRUCT SHEET METAL PLENUMS AND PARTITIONS OF NOT LIGHTER THAN 18 GAUGE GALVANIZED STEEL AND REINFORCE WITH 1–1/2 INCH BY 1/2 INCH BY 1/8 INCH ANGLES AS REQUIRED TO PREVENT DRUMMING OR BREATHING.
- M. ACOUSTICAL DUCT LINING: ACOUSTICALLY LINE ALL OUTSIDE AIR DUCTS AND PLENUMS, ALL FAN UNIT INTAKE AND DISCHARGE PLENUMS, ALL DUCTWORK INDICATED AS LINED ON THE DRAWINGS.
- N. MANUAL VOLUME DAMPERS: LOCATION OF ALL VOLUME DAMPERS ARE NOT NECESSARILY SHOWN. PROVIDE A MINIMUM OF ONE VOLUME DAMPER IN EACH SUPPLY, RETURN OR EXHAUST BRANCH.
- O. DUCT INSULATION: INSULATE ALL DUCTWORK PER SECTION 23 0700 AS REQUIRING INSULATION. IN ADDITION, ALL DUCTWORK INDICATED IN TABLE NO. 13–5 OF THE STRUCTURAL SPECIALTY CODE AND FIRE AND LIFE SAFETY REGULATIONS SHALL BE INSULATED OR LINED.
- P. FLEXIBLE DUCTWORK: SUPPORT HANGER OR SADDLE MATERIAL IN CONTACT WITH DUCT SHALL BE OF SUFFICIENT WIDTH TO PREVENT ANY RESTRICTION OF THE INTERNAL DIAMETER OF THE DUCT, AND IN NO CASE LESS THAN 1 INCH WIDE. MAXIMUM SAG TO BE 1/2 INCH PER FOOT OF SPACING BETWEEN SUPPORTS. FLEXIBLE DUCTS SHALL BE INSTALLED IN A FULLY EXTENDED CONDITION FREE OF KINKS WITH NO DIRECTION CHANGE TO EXCEED 90 DEGREES, USING ONLY THE MINIMUM LENGTH REQUIRED TO MAKE THE CONNECTION WITH A MAXIMUM LENGTH OF 24 INCHES. SHEET METAL COLLARS TO WHICH THE DUCT IS ATTACHED SHALL BE A MINIMUM OF 2 INCHES LONG. FLEXIBLE DUCT SHALL BE INSERTED INTO THE COLLAR A MINIMUM OF 1 INCH AND INNER LINER SECURED WITH A MINIMUM 1/2 INCH WIDE POSITIVE LOCKING STEEL STRAP. IN DUCTS LARGER THAN 12 INCHES DIAMETER, STEEL STRAP MUST BE SECURED BY BEADING. RESHAPE INSULATION AND VAPOR BARRIER OVER DUCT AND COLLAR AND SECURE USING DRAWBAND. ATTACHMENT OF JOINTS IS SIMILAR USING A MINIMUM OF 4 INCHES LONG COLLAR.
- Q. EXPOSED DUCTWORK JOINTS SHALL BE SEALED WITH "DUCTMATE SYSTEM".
- R. DURING CONSTRUCTION PROVIDE TEMPORARY CLOSURES OF METAL OR TAPED POLYETHYLENE ON OPEN DUCTWORK TO PREVENT CONSTRUCTION DUST FROM ENTERING DUCTWORK SYSTEM.
- S. FIBERGLASS DUCT INSTALLATION: ALL FABRICATION TO BE IN ACCORDANCE WITH SMACNA FIBROUS GLASS MANUAL, DUCT CONSTRUCTION STANDARDS.

3.3 ADJUSTING AND CLEANING

- A. CLEAN DUCT SYSTEM AND FORCE AIR AT HIGH VELOCITY THROUGH DUCT TO REMOVE ACCUMULATED DUST. TO OBTAIN SUFFICIENT AIR, CLEAN HALF THE SYSTEM AT A TIME. PROTECT EQUIPMENT WHICH MAY BE HARMED BY EXCESSIVE DIRT WITH TEMPORARY FILTERS, OR BYPASS DURING CLEANING.

SECTION 15951 – CONTROLS

1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. PROVIDE A SYSTEM OF LOW VOLTAGE ELECTRICAL CONTROLS.
- B. WIRING: SHALL BE AS REQUIRED FOR A COMPLETE OPERATING CONTROL SYSTEM, PER STATE AND NATIONAL ELECTRIC CODE. PROVIDE NECESSARY RELAYS, TRANSFORMERS, FUSING, SWITCHES AND PILOT LIGHTS. INTERLOCKS AND CONTROL POWER FROM NEAREST PANEL.

2 PRODUCTS

2.1 SMOKE DETECTORS

- A. DUAL CHAMBER IONIZATION TYPE WITH DUCT SAMPLING TUBES. UL APPROVED WITH ADJUSTABLE SENSITIVITY. ARRANGE TO STOP ASSOCIATED FAN ON PRESENCE OF SMOKE. PROVIDE IN RETURN DUCT UPSTREAM OF OUTSIDE AIR CONNECTION AND FILTERS FOR ALL FAN SYSTEMS ABOVE 2000 CFM.

2.2 TRANSFORMERS

- A. TRANSFORMERS SELECTED AND SIZED FOR APPROPRIATE VA CAPACITY AND INSTALLED AND FUSED ACCORDING TO APPLICABLE CODES. PROVIDE WIRING TO NEAREST SUITABLE POWER SOURCE AS REQUIRED.

3 EXECUTION

3.1 SEQUENCE OF OPERATION

- A. ROOF EXHAUST FAN: CONNECT TO EXISTING CONTROLS.

SECTION 15990 – TESTING, ADJUSTING, AND BALANCING

1 GENERAL

1.1 WORK INCLUDED

- F. AFTER COMPLETION OF THE WORK OF INSTALLATION, TEST AND REGULATE ALL COMPONENTS OF THE HEATING, AIR CONDITIONING AND VENTILATING SYSTEMS TO VERIFY AIR AND WATER FLOW RATES SHOWN.
- G. MEASUREMENT OF FINAL OPERATING CONDITION OF MECHANICAL SYSTEMS.

1.2 QUALITY ASSURANCE

- A. AGENCY SHALL BE COMPANY SPECIALIZING IN THE ADJUSTING AND BALANCING OF SYSTEMS SPECIFIED IN THIS SECTION WITH MINIMUM FIVE YEARS DOCUMENTED EXPERIENCE.

2 PRODUCTS

2.1 EQUIPMENT

- A. PROVIDE ALL NECESSARY PERSONNEL, EQUIPMENT AND SERVICES.

3 EXECUTION

3.1 EXAMINATION

- A. BEFORE COMMENCING WORK, VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE. ENSURE THE FOLLOWING: EQUIPMENT IS OPERABLE AND IN A SAFE AND NORMAL CONDITION. TEMPERATURE CONTROL SYSTEMS ARE INSTALLED COMPLETE AND OPERABLE. PROPER THERMAL OVERLOAD PROTECTION IS IN PLACE FOR ELECTRICAL EQUIPMENT. FINAL FILTERS ARE CLEAN AND IN PLACE. IF REQUIRED, INSTALL TEMPORARY MEDIA IN ADDITION TO FINAL FILTERS. DUCT SYSTEMS ARE CLEAN OF DEBRIS. CORRECT FAN ROTATION. FIRE AND VOLUME DAMPERS ARE IN PLACE AND OPEN. COIL FINS HAVE BEEN CLEANED AND COMBED. ACCESS DOORS ARE CLOSED AND DUCT END CAPS ARE IN PLACE. AIR OUTLETS ARE INSTALLED AND CONNECTED. DUCT SYSTEM LEAKAGE HAS BEEN MINIMIZED.
- B. REPORT ANY DEFECTS OR DEFICIENCIES NOTED DURING PERFORMANCE OF SERVICES TO ARCHITECT.
- C. BEGINNING OF WORK MEANS ACCEPTANCE OF EXISTING CONDITIONS.

3.2 PREPARATION

- A. PROVIDE INSTRUMENTS REQUIRED FOR TESTING, ADJUSTING, AND BALANCING OPERATIONS. MAKE INSTRUMENTS AVAILABLE TO ARCHITECT TO FACILITATE SPOT CHECKS DURING TESTING.

3.3 INSTALLATION TOLERANCES

- A. ADJUST AIR HANDLING SYSTEMS TO PLUS OR MINUS 10 PERCENT FOR SUPPLY, RETURN AND EXHAUST SYSTEMS FROM FIGURES INDICATED.
- B. PERMANENTLY MARK SETTINGS OF VALVES, DAMPERS, AND OTHER ADJUSTMENT DEVICES ALLOWING SETTINGS TO BE RESTORED. SET AND LOCK MEMORY STOPS.
- C. AT FINAL INSPECTION, RECHECK RANDOM SELECTIONS OF DATA RECORDED IN REPORT. RECHECK POINTS OR AREAS AS SELECTED AND WITNESSED BY THE OWNER.

3.4 ADJUSTING

- A. AFTER ADJUSTMENT, TAKE MEASUREMENTS TO VERIFY BALANCE HAS NOT BEEN DISRUPTED OR THAT SUCH DISRUPTION HAS BEEN RECTIFIED.
- B. LEAVE SYSTEMS IN PROPER WORKING ORDER, REPLACING BELT GUARDS, CLOSING ACCESS DOORS, CLOSING DOORS TO ELECTRICAL SWITCH BOXES, AND RESTORING THERMOSTATS TO SPECIFIED SETTINGS.

3.5 AIR SYSTEM PROCEDURE

- A. MAKE AIR QUANTITY MEASUREMENTS IN DUCTS BY PITOT TUBE TRAVERSE OF ENTIRE CROSS SECTIONAL AREA OF DUCT.
  - B. MEASURE AIR QUANTITIES AT AIR INLETS AND OUTLETS.
  - C. ADJUST DISTRIBUTION SYSTEM TO OBTAIN UNIFORM SPACE TEMPERATURES FREE FROM OBJECTIONABLE DRAFTS AND NOISE.
  - D. VARY TOTAL SYSTEM AIR QUANTITIES BY ADJUSTMENT OF FAN SPEEDS. PROVIDE DRIVE CHANGES REQUIRED. VARY BRANCH AIR QUANTITIES BY DAMPER REGULATION.
  - E. MEASURE STATIC AIR PRESSURE CONDITIONS ON AIR SUPPLY UNITS, INCLUDING FILTER AND COIL PRESSURE DROPS, AND TOTAL PRESSURE ACROSS THE FAN.
  - F. ADJUST OUTSIDE AIR AUTOMATIC DAMPERS, OUTSIDE AIR, RETURN AIR, AND EXHAUST DAMPERS FOR DESIGN CONDITIONS.
  - G. MEASURE TEMPERATURE CONDITIONS ACROSS OUTSIDE AIR, RETURN AIR, AND EXHAUST DAMPERS TO CHECK LEAKAGE.
  - H. WHERE MODULATING DAMPERS ARE PROVIDED, TAKE MEASUREMENTS AND BALANCE AT EXTREME CONDITIONS.
  - I. MEASURE BUILDING STATIC PRESSURE AND ADJUST SUPPLY, RETURN, AND EXHAUST AIR SYSTEMS TO PROVIDE REQUIRED RELATIONSHIP BETWEEN EACH TO MAINTAIN APPROXIMATELY 0.05 INCHES POSITIVE STATIC PRESSURE NEAR THE BUILDING ENTRIES.
- 3.6 VERIFICATION OF CONTRACTOR’S PERFORMANCE
- A. BALANCING DATA MAY BE SPOT CHECKED WITH INSTRUMENTS SIMILAR TO THAT USED BY THE BALANCING FIRM.
  - B. IF, IN THE JUDGMENT OF THE ARCHITECT, THE DISCREPANCIES WARRANT ADDITIONAL ADJUSTMENT, READJUST AND REBALANCE THE SYSTEM AT NO ADDITIONAL PROJECT COST.

TENANT IMPROVEMANT FOR:

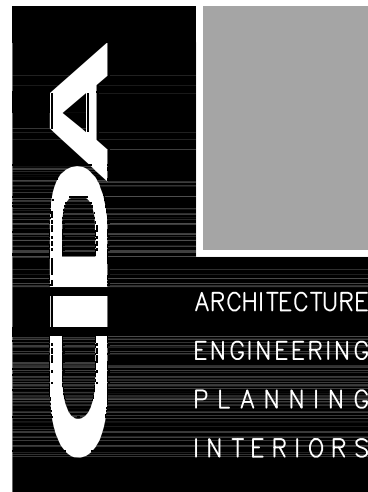
BSD OAK HILLS ELEMENTARY- TR REMODEL

2625 NW 153RD. AVE.

BEAVERTON, OREGON 97006



ISSUED DATE  
1 03.23.2020 PRELIMINARY DRAWING SET  
2 04.21.2020 PERMIT SET



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MECHANICAL  
SPECIFICATION

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