DUPLEX DWELLING UNIT

OPTION #1

2 BEDROOMS / 2 BATHROOM

1-CAR GARAGE /COVERED PORCH / OUTDOOR PATIO

OWNER: _____

ADDRESS: _____

TEL. NO.: _____

PROJECT INFORMATION

PROJECT OF:
THE COUNTY OF FRESNO
DEPARTMENT OF PUBLIC WORKS AND PLANNING

Capital Projects Division
2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SCOPE OF WORK:
PROPOSED ONE (1) STORY MULTI-FAMILY DWELLING UNIT WITH TWO (2) UNITS TOTAL.
NUMBER OF BEDROOMS PER UNIT : TWO (2)
NUMBER OF BATHROOMS PER UNIT: TWO (2)

	SQ. FT. / UNIT	TOTAL SQ. FT.
CONDITIONED SPACE	986	1972
COVERED PORCH	105	210
OPTIONAL COVERED PATIO	109	218
GARAGE	310	620
TOTAL	1510	3020

BUILDING DATA:
OCCUPANCY CLASSIFICATION: R3 / U
GROUP USE : (R-3) APARTMENT / (U) GARAGE
TYPE OF CONSTRUCTION: VB
SPRINKLERED: YES

STRUCTURAL DESIGN CRITERIA:
ROOF: DEAD LOAD = 20 PSF
LIVE LOAD = 20 PSF
WIND SPEED = 110 MPH (ALLOWABLE STRESS) / EXPOSURE C, LOW-RISE BUILDING
SEISMIC DESIGN CATEGORY: D
SS = 0.557
SDS = 0.56*
Fa = 1.374
SNOW LOAD = NONE
ALLOWABLE SOIL PRESSURE: 1500 PSF PER CBC 2022
CONCRETE DESIGN STRENGTH OF 2500 PSI PER CRC TABLE R402.2

DEFERRED SUBMITTAL ITEMS

THE OWNER / APPLICANT IS RESPONSIBLE FOR PREPARING DOCUMENTATION, APPLICATIONS, PROCESSING THROUGH THE AUTHORITY HAVING JURISDICTION AND PAYING ALL APPLICABLE FEES FOR THE DEFERRED SUBMITTALS. REFER TO "RIGHTS AND LIMITATIONS OF USING PRE-APPROVED PLANS" FOR ADDITIONAL INFORMATION.

1. ROOF TRUSSES
2. FIRE SPRINKLERS
3. SOLAR PV - MINIMUM 2.63 kW DC PER TITLE 24
4. HVAC - DUCTED MINI-SPLIT HEAT PUMP HAVING HEATING EFF. 9 HSPF AND COOLING EFF. 16.85 SEER 11.7 EER. (MODEL - LH248HV4). WITH PERMANENTLY INSTALLED WALL MOUNTED THERMOSTAT @ LIVING ROOM.

REQUIREMENTS

FIRE DEPARTMENT APPROVAL MUST BE OBTAINED. PROVIDE EVIDENCE OF FIRE PROTECTION DISTRICT APPROVAL TO MATTHEW B. LOPEZ, PLANS EXAMINER AT (559) 600-4324 OR E-MAIL_mattlopez@fresnocountyca.gov.

FOR QUESTIONS REGARDING ZONING REQUIREMENTS, CONTACT: ZONING, AT (559) 600-4540 OR E-MAIL: zoningenforcement2 @fresnocountyca.gov

FOR QUESTIONS REGARDING GRADING REQUIREMENTS, CONTACT: DANA RITSCHEL, AT (559) 600-4212 OR EMAIL: dritschel@fresnocountyca.gov

FOR QUESTIONS REGARDING CODE ENFORCEMENT COMMENTS, CONTACT: Elisania Harrison at (559) 600-2519 or e-mail, eharrison@fresnocountyca.gov

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8.5" x 11" ATTACHMENTS:
STRUCTURAL ANALYSIS
TITLE 24 DOCUMENTATION

ADDITIONAL REQUIREMENTS

1. STATE LAW REQUIRES THIS PROJECT COMPLY WITH THE CURRENT EDITION OF THE CALIFORNIA FIRE CODE. CONTACT THE FOLLOWING FIRE PROTECTION DISTRICT AND OBTAIN APPROVALS PRIOR TO OBTAINING THE PERMITS FROM THE COUNTY OF FRESNO, VERIFY THE SITE ADDRESS WITH THE CORRECT JURISDICTION BELOW:

   FRESNO COUNTY FIRE PROTECTION DISTRICT
   1700 JENSEN AVENUE SUITE 103
   SANGER, CA. 93657
   PHONE: (559) 319-0400

   CITY OF FRESNO FIRE DEPARTMENT
   911 H ST.
   FRESNO, CA. 93721
   PHONE: (559) 621-4000

   THE COUNTY OF FRESNO
   DEPARTMENT OF PUBLIC WORKS AND PLANNING
   DEVELOPMENT SERVICES
   2220 TULARE ST. STREET LEVEL.
   FRESNO, CA. 93721
   PHONE (559) 600-4219

   NORTH CENTRAL FIRE DEPARTMENT
   15850 W. KEARNEY BLVD.
   KERMAN, CA. 93630
   PHONE (559) 275-5531

   CSA 50 – AUBERRY VOLUNTEER FIRE DEPARTMENT
   PO BOX 191
   AUBERRY, CA. 93602
   559-855-2777

   SHAVER LAKE FIRE DISTRICT
   41795 TOLLHOUSE
   SHAVER LAKE, CA. 93664
   559-841-8136

   ORANGE COVE FIRE DEPARTMENT
   550 CENTER STREET
   ORANGE COVE, CA. 93646
   559-626-7758

2. PROVIDE A COMPLETE SITE PLAN AS PART OF THE PLANS, DRAWN TO SCALE, ON A FULL-SIZE SHEET WITH THE FOLLOWING INFORMATION:
   A. PROVIDE PROPERTY LINE DIMENSIONS.
   B. INDICATE A NORTH ARROW.
   C. DIMENSION DISTANCES TO ALL PROPERTY LINES AND ADJACENT BUILDINGS.
   D. LOCATE THE FOLLOWING:
      a. ALL STRUCTURES ON-SITE.
      b. EASEMENTS AND SETBACKS.
      c. MECHANICAL OR OTHER GROUND MOUNTED EQUIPMENT.
      d. LPG TANKS OR GAS METER.
      e. WELLS OR WATER METERS.
      f. SEPTIC SYSTEMS (INCLUDING 100% EXPANSION AREA FOR LEACHING FIELD) OR SEWER CONNECTIONS.
      g. DRIVEWAY (MATERIALS TO BE USED FOR THE DRIVEWAY).
3. PROVIDE A DRAINAGE PLAN FOR THE DEVELOPED PORTION OF THE PROPERTY [CRC R300.2].
   A. FOR VALLEY FLOOR ("FLAT" LAND) PARCELS, ADDRESS THE FOLLOWING:
      A. SHOW THE DRAINAGE AWAY FROM THE PROPOSED CONSTRUCTION. "PROVIDE A TWO PERCENT SLOPE AWAY FROM THE PROPOSED BUILDING FOR A MINIMUM OF FIVE FEET." [FCOC 15.08.020 O].
      B. SHOW DRAINAGE PATTERNS TO THE STREET OR AN APPROVED DRAINAGE FACILITY.
      C. PROVIDE ACTUAL/RELATIVE ELEVATIONS FOR THE BUILDING PAD, LOT CORNERS AND CROWN OF ADJACENT STREETS. "FINISH FLOOR ELEVATION IS TO BE ABOVE THE CROWN OF THE STREET."
      D. DELINEATE THE EXTENT OF THE BUILDING PAD WITH DIMENSIONS FROM THE BUILDING TO THE EDGE OF THE PAD.
   B. FOR ALL FOOTHILL AND MOUNTAIN PARCELS WITH SLOPED GRADES, ADDRESS THE FOLLOWING:
      A. SHOW THE DRAINAGE AWAY FROM THE PROPOSED CONSTRUCTION. "PROVIDE A TWO PERCENT SLOPE AWAY FROM THE PROPOSED BUILDING FOR A MINIMUM OF FIVE FEET." [FCOC 15.08.020 O].
      B. SHOW DRAINAGE PATTERNS TO THE STREET OR AN APPROVED DRAINAGE FACILITY (EXISTING AND PROPOSED CONTOURS) INCLUDING:
         - TERRACING.
         - SWALES.
         - RETAINING WALLS.
         - ROOF RAINWATER RUNOFF. SHOW GUTTERS AND DOWNSPOUT DISCHARGE LOCATIONS.
   C. DELINEATE THE EXTENT OF THE BUILDING PAD WITH DIMENSIONS FROM THE BUILDING TO THE EDGE OF THE PAD.
   D. CUT AND FILL AREAS (WITH QUANTITIES IN CUBIC YARDS) ON BOTH PLAN AND SCHEMATIC (SECTION) VIEWS IN BOTH DIRECTIONS.
   E. DRIVEWAYS AND PRIVATE ROADS SHALL HAVE A MAXIMUM SLOPE OF 12%. THE GRADE MAY BE INCREASED TO A MAXIMUM OF 20% FOR PAVED SURFACES." [FCOC 15.60.505].

ADD THE FOLLOWING NOTES ON THE SITE OR DRAINAGE PLANS:
A. "FINISH FLOOR ELEVATION IS TO BE ABOVE THE CROWN OF THE STREET."
B. "PROVIDE A TWO PERCENT SLOPE AWAY FROM THE PROPOSED BUILDING FOR A MINIMUM OF FIVE FEET." [FCOC 15.08.020 O].
C. "DRIVEWAYS AND PRIVATE ROADS SHALL HAVE A MAXIMUM SLOPE OF 12%. THE GRADE MAY BE INCREASED TO A MAXIMUM OF 20% FOR PAVED SURFACES." [FCOC 15.60.505].

APPLICABLE CODE

2022 CALIFORNIA ADMINISTRATIVE CODE
2022 CALIFORNIA BUILDING CODE
2022 CALIFORNIA PLUMBING CODE
2022 CALIFORNIA MECHANICAL CODE
2022 CALIFORNIA ELECTRICAL CODE
2022 CALIFORNIA FIRE CODE
2022 CALIFORNIA RESIDENTIAL CODE
2022 CALIFORNIA ENERGY CODE
2022 CALIFORNIA GREEN BUILDING CODE
2022 CALIFORNIA REFERENCE STANDARDS CODE
FRESNO COUNTY ORDINANCE TITLE 15

REFER TO G-101 , G-102 FOR ADDITIONAL INFORMATION.

GENERAL NOTES:

1. CONSTRUCTION WASTE MANAGEMENT PLAN MUST BE FINALIZED PRIOR TO OCCUPANCY.
2. INSTALL STREET ADDRESS NUMERALS, AT LEAST FOUR INCHES HIGH WITH MINIMUM 1/2-INCH STROKE, MOUNTED ON A CONTRASTING BACKGROUND CLEARLY VISIBLE FROM THE STREET.
3. PRIOR TO PERMIT ISSUANCE, PROVIDE AN ADDITIONAL FLOOR PLAN AND SITE PLAN FOR USE BY THE ASSESSOR'S OFFICE.

RIGHTS AND LIMITATIONS IN USING PRE-APPROVED PLANS

1. RIGHTS OF THE OWNER / BUILDER:
   A. THE OWNER / BUILDER HAS THE RIGHT TO UTILIZE THE PRE-APPROVED PLANS FOR THEIR INTENDED CONSTRUCTION PROJECT, SUBJECT TO COMPLIANCE WITH APPLICABLE REGULATIONS AND GUIDELINES.
2. RESPONSIBILITY OF THE OWNER / BUILDER:
   A. THE OWNER / BUILDER IS RESPONSIBLE FOR SUBMITTING ALL ITEMS LISTED UNDER THE DEFERRED SUBMITTAL AS REQUIRED BY THE RELEVANT AUTHORITIES. THIS INCLUDES ANY ADDITIONAL DOCUMENTS, PERMITS, OR INFORMATION THAT WERE NOT INCLUDED IN THE PRE-APPROVED PLANS.
   B. THE OWNER / BUILDER MUST ENSURE THAT THE CONSTRUCTION PROJECT ADHERES TO ALL RELEVANT BUILDING CODES, ZONING REGULATIONS, AND OTHER APPLICABLE LAWS.
   C. IT IS THE RESPONSIBILITY OF THE OWNER / BUILDER TO SECURE APPROVAL FROM THE ZONING DEPARTMENT FOR SITE-SPECIFIC LOCATIONS. THE PRE-APPROVED PLANS DO NOT INCLUDE SUCH SITE-SPECIFIC DETAILS, AND THE OWNER / BUILDER MUST OBTAIN NECESSARY PERMITS OR VARIANCES AS REQUIRED.
3. LIMITATIONS ON SITE-SPECIFIC LOCATIONS:
   A. THE PRE-APPROVED PLANS DO NOT PROVIDE SITE-SPECIFIC INFORMATION OR DETAILS REGARDING THE CONSTRUCTION SITE. THE OWNER / BUILDER MUST CONSULT WITH THE APPROPRIATE AUTHORITIES, SUCH AS THE ZONING DEPARTMENT, TO OBTAIN THE NECESSARY APPROVALS FOR THE SPECIFIC LOCATION OF THE CONSTRUCTION PROJECT.
   B. THE OWNER / BUILDER MUST COMPLY WITH ALL ZONING REGULATIONS, SETBACK REQUIREMENTS, ENVIRONMENTAL CONSIDERATIONS, AND ANY OTHER SITE-SPECIFIC RESTRICTIONS IMPOSED BY THE RELEVANT AUTHORITIES.
4. COMPLIANCE WITH BUILDING CODES AND REGULATIONS:
   A. THE OWNER / BUILDER MUST ENSURE THAT THE CONSTRUCTION PROJECT COMPLIES WITH ALL APPLICABLE BUILDING CODES, REGULATIONS, AND STANDARDS, EVEN IF THE PRE-APPROVED PLANS WERE UTILIZED.
   B. THE USE OF PRE-APPROVED PLANS DOES NOT EXEMPT THE OWNER / BUILDER FROM FULFILLING THEIR OBLIGATIONS TO OBTAIN ALL NECESSARY PERMITS AND APPROVALS AS REQUIRED BY LOCAL, STATE, AND FEDERAL REGULATIONS.
5. LIABILITY AND INDEMNIFICATION:
   A. THE OWNER / BUILDER ASSUMES ALL LIABILITY AND RESPONSIBILITY FOR THE CONSTRUCTION PROJECT, INCLUDING ANY CONSEQUENCES ARISING FROM THE USE OF THE PRE-APPROVED PLANS.
   B. THE OWNER / BUILDER AGREES TO INDEMNIFY AND HOLD HARMLESS THE RELEVANT AUTHORITIES, ARCHITECTS, ENGINEERS, AND ANY OTHER PARTIES INVOLVED IN THE APPROVAL PROCESS, FROM ANY CLAIMS, DAMAGES, OR LIABILITIES ARISING OUT OF THE USE OF THE PRE-APPROVED PLANS OR THE CONSTRUCTION PROJECT.
6. GEOGRAPHIC LIMITATIONS:
   A. THE PRE-APPROVED PLANS ARE NOT INTENDED FOR AREAS SUBJECT TO SNOW LOAD, WILDFIRE RISK, FLOOD ZONES, OR OTHER SPECIFIC GEOGRAPHIC CONDITIONS.
   B. THE OWNER / BUILDER ACKNOWLEDGES AND UNDERSTANDS THAT THE PRE-APPROVED PLANS MAY NOT ACCOUNT FOR UNIQUE SITE CONDITIONS.
7. SITE-SPECIFIC CONSIDERATIONS:
   A. THE OWNER / BUILDER MUST ASSESS AND ADDRESS ANY SITE-SPECIFIC FACTORS THAT ARE NOT COVERED BY THE PRE-APPROVED PLANS, INCLUDING BUT NOT LIMITED TO SOIL CONDITIONS, TOPOGRAPHY, DRAINAGE, AND OTHER ENVIRONMENTAL CONSIDERATIONS.
   B. IT IS THE RESPONSIBILITY OF THE OWNER / BUILDER TO ENGAGE THE NECESSARY PROFESSIONALS, SUCH AS GEOTECHNICAL ENGINEERS OR ENVIRONMENTAL CONSULTANTS, TO EVALUATE AND MITIGATE ANY SITE-SPECIFIC RISKS OR CHALLENGES.
8. COMPLIANCE WITH LOCAL REGULATIONS:
   A. THE OWNER / BUILDER MUST COMPLY WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS THAT APPLY TO THEIR SPECIFIC GEOGRAPHIC AREA, INCLUDING BUT NOT LIMITED TO BUILDING CODES, ZONING ORDINANCES, FIRE CODES, AND ENVIRONMENTAL REGULATIONS.
   B. THE USE OF THE PRE-APPROVED PLANS DOES NOT EXEMPT THE OWNER / BUILDER FROM FULFILLING THEIR OBLIGATIONS TO ADHERE TO THESE LOCAL REGULATIONS AND OBTAIN ANY NECESSARY PERMITS OR APPROVALS.
9. MODIFICATION RESTRICTIONS:
   A. THE OWNER / BUILDER SHOULD BE AWARE THAT MODIFICATIONS TO THE PRE-APPROVED PLANS MAY BE REQUIRED TO ADDRESS SPECIFIC SITE CONDITIONS OR MEET LOCAL REGULATIONS. ANY SUCH MODIFICATIONS MUST BE CARRIED OUT IN COMPLIANCE WITH THE APPLICABLE LAWS AND REGULATIONS.
   B. THE OWNER / BUILDER MAY NEED TO ENGAGE DESIGN PROFESSIONALS, SUCH AS ARCHITECTS OR ENGINEERS, TO REVIEW AND REVISE THE PRE-APPROVED PLANS AS NECESSARY TO ENSURE COMPLIANCE WITH LOCAL REQUIREMENTS.
10. RELIANCE AND VERIFICATION:
   A. THE OWNER / BUILDER ACKNOWLEDGES THAT THE USE OF PRE-APPROVED PLANS IS BASED ON THE ASSUMPTION THAT THEY ARE ACCURATE, COMPLETE, AND COMPLIANT WITH RELEVANT REGULATIONS.
   B. HOWEVER, THE OWNER / BUILDER ALSO UNDERSTANDS THAT IT IS THEIR RESPONSIBILITY TO VERIFY THE SUITABILITY AND APPLICABILITY OF THE PRE-APPROVED PLANS FOR THEIR SPECIFIC PROJECT AND SITE CONDITIONS. THEY SHOULD EXERCISE DUE DILIGENCE IN CONFIRMING THE PLANS' ADEQUACY BEFORE PROCEEDING WITH CONSTRUCTION.

AGING-IN-PLACE DESIGN AND FALL PROTECTION

A. THE BATHROOM SHALL BE PROVIDED WITH REINFORCEMENT INSTALLED IN ACCORDANCE WITH THIS SECTION. WHERE THERE IS NO BATHROOM ON THE ENTRY LEVEL, AT LEAST ONE BATHROOM ON THE SECOND OR THIRD FLOOR OF THE DWELLING SHALL COMPLY WITH THIS SECTION, [CRC R327.1.1]
   1. REINFORCEMENT SHALL BE SOLID LUMBER OR OTHER CONSTRUCTION MATERIALS APPROVED BY THE ENFORCING AGENCY. [CRC R327.1.1(1)]
   2. REINFORCEMENT SHALL NOT BE LESS THAN 2 INCHES BY 8-INCH NOMINAL LUMBER (1-1/2 INCH BY 7-1/4-INCH ACTUAL DIMENSION) OR OTHER CONSTRUCTION MATERIAL PROVIDING EQUAL HEIGHT AND LOAD CAPACITY. REINFORCEMENT SHALL BE LOCATED BETWEEN 32 INCHES AND 39-1/4 INCHES ABOVE THE FINISH FLOOR FLUSH WITH WALL FRAMING [CRC R327.1.1(2)]
   3. WATER CLOSET REINFORCEMENT SHALL BE INSTALLED ON BOTH SIDE WALLS OF THE FIXTURE OR ONE SIDE WALL AND BACK WALL. [CRC R327.1.1(3)]
   4. SHOWER REINFORCEMENT SHALL BE CONTINUOUS WHERE WALL FRAMING IS PROVIDED. [CRC R327.1.1(4)]
   5. BATHTUB AND COMBINATION BATHTUB/SHOWER REINFORCEMENT SHALL BE CONTINUOUS ON EACH END OF THE BATHTUB AND THE BACK WALL. ADDITIONALLY, BACK WALL REINFORCEMENT FOR A LOWER GRAB BAR SHALL BE PROVIDED WITH THE BOTTOM EDGE LOCATED NO MORE THAN 6 INCHES ABOVE THE BATHTUB RIM [CRC R327.1.1(5)]
      A. WHERE THE WATER CLOSET IS NOT PLACED ADJACENT TO A SIDEWALL CAPABLE OF ACCOMMODATING A GRAB BAR, THE BATHROOM SHALL HAVE PROVISIONS FOR INSTALLATION OF FLOOR-MOUNTED, FOLD-AWAY, OR SIMILAR ALTERNATE GRAB BAR REINFORCEMENTS APPROVED THE ENFORCING AGENCY [CRC R327.1.1 EXCEPTION 1]
      B. REINFORCEMENT SHALL NOT BE REQUIRED IN WALL FRAMING FOR PREFABRICATED SHOWER ENCLOSURES AND BATHTUB WALL PANELS WITH INTEGRAL FACTORY INSTALLED GRAB BARS OR WHEN FACTORY INSTALLED REINFORCEMENT FOR GRAB BARS IS PROVIDED. [CRC R327.1.1 EXCEPTION 2]
      C. SHOWER ENCLOSURES THAT DO NOT PERMIT INSTALLATION OF REINFORCEMENT AND OR GRAB BARS SHALL BE PERMITTED, PROVIDED REINFORCEMENT FOR INSTALLATION OF FLOOR MOUNTED GRAB BARS OR AN ALTERNATE METHOD IS APPROVED BY THE ENFORCING AGENCY. [CRC R327.1.1 EXCEPTION 3]
      D. BATHTUBS WITH NO SURROUNDING WALLS, OR WHERE WALL PANELS DO NOT PERMIT THE INSTALLATION OF REINFORCEMENT SHALL BE PERMITTED, PROVIDED REINFORCEMENT FOR INSTALLATION OF FLOOR MOUNTED GRAB BARS ADJACENT TO THE BATHTUB OR AN ALTERNATE METHOD IS APPROVED BY THE ENFORCING AGENCY. [CRC R327.1.1 EXCEPTION 4]
      E. REINFORCEMENT OF FLOORS SHALL NOT BE REQUIRED FOR BATHTUBS AND WATER CLOSETS INSTALLED ON CONCRETE SLABS. [CRC R327.1.1 EXCEPTION 5]
B. DOORBELL BUTTONS OR CONTROLS, WHEN INSTALLED SHALL NOT EXCEED 48 INCHES ABOVE EXTERIOR FLOOR OR LANDING, MEASURED FROM THE TOP OF THE DOORBELL BUTTON ASSEMBLY. WHERE DOORBELL BUTTONS INTEGRATED WITH OTHER FEATURES ARE REQUIRED TO BE INSTALLED ABOVE 48 INCHES MEASURED FROM THE EXTERIOR FLOOR OR LANDING, A STANDARD DOORBELL BUTTON OR CONTROL SHALL ALSO BE PROVIDED AT A HEIGHT NOT EXCEEDING 48 INCHES ABOVE EXTERIOR FLOOR OR LANDING, MEASURED FROM THE TOP OF THE DOORBELL CONTROL [CRC R327.1.4]
C. R327.1.2 ELECTRICAL RECEPTACLE OUTLET, SWITCH AND CONTROL HEIGHTS. ELECTRICAL RECEPTACLE OUTLETS, SWITCHES, AND CONTROLS (INCLUDING CONTROLS FOR HEATING, VENTILATION, AND AIR CONDITIONING) INTENDED TO BE USED BY OCCUPANTS, SHALL BE LOCATED NO MORE THAN 48 INCHES (1219.2 MM) MEASURED FROM THE TOP OF THE OUTLET BOX AND NOT LESS THAN 15 INCHES (381 MM) MEASURED FROM THE BOTTOM OF THE OUTLET BOX ABOVE THE FINISH FLOOR.
   EXCEPTIONS:
   A. DEDICATED RECEPTACLE OUTLETS; FLOOR RECEPTACLE OUTLETS; CONTROLS MOUNTED ON CEILING FANS AND CEILING LIGHTS; AND CONTROLS LOCATED ON APPLIANCES.
   B. RECEPTACLE OUTLETS REQUIRED BY THE CALIFORNIA ELECTRICAL CODE ON A WALL SPACE WHERE THE DISTANCE BETWEEN THE FINISHED FLOOR AND A BUILT-IN FEATURE ABOVE THE FINISH FLOOR, SUCH AS A WINDOW, IS LESS THAN 15 INCHES.

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION
2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT — ROBERT R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF THE ARCHITECT AND SHALL NOT BE USED ON ANY OTHER PROJECT OR LOCATIONS EXCEPT AS DESCRIBED ON THE DRAWINGS WITHOUT WRITTEN AGREEMENT WITH THE ARCHITECT.

TITLE

COVER SHEET

SCALE: As indicated

A-100

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY: LL	CHECKED BY: RW

©

1/2/2024 4:32:19 PM
24" X 36"

GENERAL NOTES

1. SCOPE OF WORK SHALL BE CONSTRUCTED ACCORDING TO THESE WORKING DRAWINGS AS AGREED UPON BETWEEN OWNER AND CONTRACTOR. THE WORD "CONTRACTOR" REFERS TO THE GENERAL CONTRACTOR. "SUBCONTRACTOR" REFERS TO ONE HAVING DIRECT CONTACT WITH THE CONTRACTOR.

2. CONTRACTOR'S RESPONSIBILITIES:
   - A. CONTRACTOR AND SUBCONTRACTORS SHALL VISIT THE JOB SITE BEFORE THEIR BID IS SUBMITTED TO FAMILIARIZE THEMSELVES WITH EXISTING CONDITIONS.
   - B. THE GENERAL CONTRACTOR SHALL READ, EXAMINE AND BE THOROUGHLY FAMILIAR WITH THESE DRAWINGS AND WITH THE EXISTING SITE CONDITIONS PRIOR TO THE START OF WORK. IN THE EVENT THERE ARE DISCREPANCIES OR OMISSIONS WITHIN THE DRAWINGS AND/OR SPECIFICATIONS, THE GENERAL CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY.
   - C. CONTRACTOR SHALL INVESTIGATE SITE DURING CLEARING AND EARTHWORK OPERATIONS FOR FILLED EXCAVATIONS OR BURIED STRUCTURES SUCH AS CESSPOOLS, CISTERNS, FOUNDATION, ETC., AND BURIED ARTIFACTS SUCH AS INDIAN OR DINOSAUR BONES. IF ANY SUCH ITEMS ARE FOUND THE ARCHITECT, CIVIL ENGINEER, AND SOILS ENGINEER SHALL BE NOTIFIED IMMEDIATELY.
   - D. NO DRAWINGS, DETAILS, NOTES ETC., SHALL BE INTERPRETED TO ALLOW FOR A VIOLATION OF THE LOCAL BUILDING CODE, STATE BUILDING CODE AND OTHER APPLICABLE CODES AND GOOD CONSTRUCTION PRACTICES.
   - E. THE GENERAL CONTRACTOR SHALL REVIEW ALL GRADE ELEVATIONS PRIOR TO CONSTRUCTION.
   - F. CONTRACTORS SHALL VERIFY ALL DIMENSIONS, CONSTRUCTION METHODS, MATERIALS, SIZE OF MEMBERS, ETC., PRIOR TO ON-SITE DELIVERY.
   - G. CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO FULLY PROTECT ADJACENT PROPERTIES.
   - H. JOB SHALL BE COMPLETED WITH AS MUCH SPEED AS POSSIBLE WHEN WORK BEGINS.
   - I. INSPECTIONS: THE CONTRACTOR SHALL OBTAIN ALL REQUIRED INSPECTIONS FOR HIS WORK AND GIVE THE OWNER TIMELY NOTICE OF HIS INTENT TO HAVE INSPECTION.
   - J. THE GENERAL CONTRACTOR SHALL COORDINATE AND VERIFY WITH THE PLUMBING, MECHANICAL AND ELECTRICAL CONTRACTORS, THE SIZE AND LOCATION OF ALL PIPING, DUCTWORK, TRENCHES, SLEEVES, SPECIAL BOLTING FOR EQUIPMENT CONDUITS, ETC.
   - K. THE DESIGN, ADEQUACY AND SAFETY OF ERECTION, BRACING, SHORING, TEMPORARY SUPPORTS, ETC., IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR, AND HAS NOT BEEN CONSIDERED BY THE STRUCTURAL ENGINEER AND ARCHITECT.
   - L. THE CONTRACTOR SHALL PROVIDE ALL RISK INSURANCE. REFER TO PROJECT MANUAL FOR MINIMUM LIABILITY AND PROJECT DAMAGE COVERAGE.
   - M. THE GENERAL CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY SANITARY FACILITY ENCLOSURES. LOCATE AS DIRECTED BY OWNER.
   - N. THE GENERAL CONTRACTOR AND ALL SUBCONTRACTORS SHALL COMPLY WITH ALL APPLICABLE LAWS AND CODE REGULATIONS. THESE CODES INCLUDE BUT NOT LIMITED TO THE FOLLOWING:
     2022 CALIFORNIA ADMINISTRATIVE CODE
     2022 CALIFORNIA BUILDING CODE
     2022 CALIFORNIA PLUMBING CODE
     2022 CALIFORNIA MECHANICAL CODE
     2022 CALIFORNIA ELECTRICAL CODE
     2022 CALIFORNIA FIRE CODE
     2022 CALIFORNIA RESIDENTIAL CODE
     2022 CALIFORNIA ENERGY CODE
     2022 CALIFORNIA GREEN BUILDING CODE
     2022 CALIFORNIA REFERENCE STANDARDS CODE
     FRESNO COUNTY ORDINANCE TITLE 15
   - O. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS, VERIFY FIELD CONDITIONS, AND CAREFULLY COMPARE WITH THE CONSTRUCTION DOCUMENTS SUCH FIELD MEASUREMENTS, CONDITIONS, AND OTHER INFORMATION KNOWN TO CONTRACTOR BEFORE COMMENCING THE WORK. ERRORS, INCONSISTENCIES, OR OMISSIONS DISCOVERED AT ANY TIME SHALL BE PROMPTLY REPORTED IN WRITING TO THE OWNER / BUILDER.
   - P. CONTRACTOR SHALL PROMPTLY NOTIFY OWNER'S REPRESENTATIVE IF CONTRACTOR BECOMES AWARE DURING THE PERFORMANCE OF THE WORK THAT THE CONSTRUCTION DOCUMENTS ARE NOT IN COMPLIANCE WITH APPLICABLE CODE REQUIREMENTS.
   - Q. BY SUBMITTAL OF BID, CONTRACTOR WARRANTS TO OWNER / BUILDER THAT ALL MATERIALS AND EQUIPMENT TO BE FURNISHED ARE NEW UNLESS NOTED OTHERWISE AND ALL WORK WILL BE OF GOOD QUALITY AND FREE FROM FAULTS AND DEFECTS.
   - R. SUBCONTRACTORS SHALL INSURE THAT ALL WORK IS DONE IN A PROFESSIONAL WORKMANLIKE MANNER BY SKILLED MECHANICS AND SHALL BE REPLACE ANY MATERIALS OR ITEMS DAMAGED BY SUB-CONTRACTOR'S PERFORMANCE. SUBCONTRACTORS AND SUPPLIERS ARE HEREBY NOTIFIED THAT THEY ARE TO CONFER AND COOPERATE FULLY WITH EACH OTHER DURING THE COURSE OF CONSTRUCTION TO DETERMINE THE EXACT EXTENT AND OVERLAP OF EACH OTHER'S WORK AND TO SUCCESSFULLY COMPLETE THE EXECUTION OF THE WORK. ALL SUBCONTRACTOR WORKMANSHIP SHALL BE OF QUALITY TO PASS INSPECTIONS BY LOCAL AUTHORITIES, LENDING INSTITUTIONS, ARCHITECT OR BUILDER. ANY ONE OR ALL OF THE ABOVE MENTIONED INSPECTORS MAY INSPECT WORKMANSHIP AT ANY TIME, AND CORRECTIONS NEEDED TO ENHANCE THE QUALITY OF BUILDING WILL BE DONE IMMEDIATELY. EACH SUBCONTRACTOR, UNLESS SPECIFICALLY EXEMPTED BY THE TERMS OF HIS / HERS SUBCONTRACT AGREEMENT, SHALL BE RESPONSIBLE FOR CLEANING UP AND REMOVING FROM THE JOB SITE ALL TRASH AND DEBRIS NOT LEFT BY OTHER SUBCONTRACTORS. OWNER / BUILDER WILL DETERMINE HOW SOON AFTER SUBCONTRACTOR COMPLETES EACH PHASE OF HIS / HER WORK THAT TRASH AND DEBRIS WILL BE REMOVED FROM THE SITE.
   - S. APPROVAL BY THE BUILDING INSPECTOR DOES NOT MEAN APPROVAL OR ALLOWABLE FAILURE TO COMPLY WITH THE PLANS AND SPECIFICATIONS. ANY DESIGN WHICH FAILS TO BE CLEAR OR IS AMBIGUOUS MUST BE REFERRED TO THE ARCHITECT OR ENGINEER FOR INTERPRETATION OR CLARIFICATION.
   - T. ALL EQUIPMENT AND MATERIALS FURNISHED AND INSTALLED UNDER THESE PLANS SHALL BE GUARANTEED BY THE CONTRACTOR FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE OF THE WORK BY OWNER BUILDER UNLESS STIPULATED OTHERWISE.
   - U. ALL TRADE NAMES AND BRAND NAMES CONTAINED HEREIN ESTABLISH QUALITY STANDARDS. SUBSTITUTIONS ARE PERMITTED, WITH PRIOR APPROVAL B THE OWNER'S REPRESENTATIVE. THE CONTRACTOR SHALL SUBMIT FOR THE ARCHITECT'S AND BUILDERS APPROVAL ALL MATERIALS OR EQUIPMENT WHICH IS CONSIDERED "OR EQUAL" TO THAT SPECIFIED.
   - V. CONSTRUCTION DOCUMENTS IDENTIFIED A "NOT FOR CONSTRUCTION" WATERMARK ON ANY OR ALL SHEETS MAY BE SUBJECT TO REVIEW. THIS REVIEW MAY RESULT IN CHANGES WHICH MAY BE MADE TO THE PLANS PRIOR TO THE ISSUANCE OF THE FINAL CONSTRUCTION SET WHICH WILL CONTAIN NO WATERMARK DESIGNATIONS. CONSTRUCTION DOCUMENTS IDENTIFIED WITH A WATERMARK ARE NOT TO BE CONSTRUED AS BEING THE COMPLETED OR FINAL DRAWINGS AND THEY SHOULD NOT IN ANY WAY BE USED AS SUCH.
   - W. ALL STANDARD NOTES CONTAINED HEREIN ARE TYPICAL UNLESS NOTED OTHERWISE
   - X. TYPICAL DETAILS AND SPECIFICATIONS ARE MINIMUM REQUIREMENTS TO BE USED WHEN CONDITIONS ARE NOT SHOWN OTHERWISE.
     SPECIFIC NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NO DETAILS ARE SHOWN CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT.
   - Y. THE CONSTRUCTION DOCUMENTS AND ALL COPIES THEREOF FURNISHED TO CONTRACTOR ARE THE PROPERTY OF THE COUNTY AND ARE NOT TO BE USED ON OTHER WORK.

3. ERRORS AND OMISSION: IF ANY ERRORS OR OMISSIONS APPEAR IN THESE DRAWINGS, OR OTHER CONTRACT DOCUMENTS, THE GENERAL CONTRACTOR AND SUBCONTRACTORS AFFECTED SHALL NOTIFY THE OWNER / BUILDER IN WRITING OF SUCH ERROR OR OMISSION. IN THE EVENT OF FAILING TO GIVE SUCH WRITTEN NOTICE BEFORE CONSTRUCTION AND/OR FABRICATION OF THE WORK, HE WILL BE HELD RESPONSIBLE FOR THE RESULT OF THE ANY SUCH ERRORS OR OMISSIONS AND THE COST FOR RECTIFYING THE SAME.
4. GUARANTEES: CONTRACTOR SHALL GUARANTEE THE WORK IN GENERAL FOR ONE YEAR AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR LEAVING THE BUILDING FREE FROM DEFECTS OF MATERIALS AND POOR WORKMANSHIP FROM DATE OF COMPLETION. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE STATING THAT ALL WORK EXECUTED BY HIM WILL BE FREE FROM DEFECTS OF THE MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR (UNLESS OTHERWISE SPECIFIED) FROM DATE OF ACCEPTANCE OF HIS WORK, THAT HE WILL REPAIR AND REPLACE ALL SUCH DEFECTIVE WORK AND ALL OTHER WORK DAMAGE WITHOUT COST TO THE OWNER.
5. ASSURING THAT PLANS ARE BEING FOLLOWED, IT DOES NOT RELIEVE THE CONTRACTOR OR ANY SUBCONTRACTORS FROM ANY RESPONSIBILITY FOR WORK WHICH MAY PROVE FAULTY.
6. JOB CONDITIONS:
   - A. DUST CONTROL: USE ALL MEANS NECESSARY TO PREVENT THE SPREAD OF DUST DURING THE PERFORMANCE OF SITE WORK. THOROUGHLY MOISTEN ALL EXTERIOR SURFACES AS REQUIRED TO PREVENT DUST FROM BEING A NUISANCE TO THE PUBLIC, NEIGHBORS AND CONCURRENT PERFORMANCE OF OTHER WORK ON THE SITE.
   - B. PROTECTION: USE ALL MEANS NECESSARY TO PROTECT EXISTING OBJECTS TO REMAIN AND IN THE EVENT OF DAMAGE, IMMEDIATELY MAKE ALL REPAIRS AND REPLACEMENTS NECESSARY TO THE SATISFACTION OF THE ARCHITECT AND AT NO ADDITIONAL COST TO THE OWNER.
7. PREPARATION:
   - A. CONTRACTOR SHALL INVESTIGATE SITE DURING CLEARING AND EARTHWORK OPERATIONS FOR FILLED EXCAVATIONS OR BURIED STRUCTURES SUCH AS CESSPOOLS, CISTERNS, FOUNDATION, ETC., AND BURIED ARTIFACTS SUCH AS INDIAN OR DINOSAUR BONES. IF ANY SUCH ITEMS ARE FOUND THE ARCHITECT, CIVIL ENGINEER, AND SOILS ENGINEER SHALL BE NOTIFIED IMMEDIATELY.
   - B. NOTIFICATION: THE CONTRACTOR SHALL INFORM THE OWNER AND ARCHITECT OF THE DATE FOR START OF SITE WORK. THE DATE SHALL BE ACCEPTABLE TO ALL PARTIES.
   - C. SITE INSPECTION:
     - PRIOR TO ANY DEMOLITION, CAREFULLY INSPECT THE ENTIRE SITE & ALL OBJECTS DESIGNATED TO BE REMOVED & TO REMAIN.
     - LOCATE ALL EXISTING UTILITY LINES AND EQUIPMENT. DETERMINE WHICH UTILITIES MUST BE REMOVED AND WHICH ARE TO REMAIN AS WELL AS ALL REQUIREMENTS FOR DISCONNECTING OR CAPPING.
   - D. PROTECTIVE WORKS:
     - DEMOLITION SHALL NOT PROCEED UNTIL SUCH PROTECTIVE WORKS ARE PLACED AS ARE REQUIRED TO PROTECT THE PROPERTY AND PERSONNEL FROM THAT HAZARDS OF THE WORK.
     - LOCATE ALL EXISTING UTILITY LINES AND EQUIPMENT. DETERMINE WHICH UTILITIES MUST BE REMOVED AND WHICH ARE TO REMAIN AS WELL AS ALL REQUIREMENTS FOR DISCONNECTING OR CAPPING.
   - E. DAMAGE TO EXISTING WORK: EXISTING WORK DAMAGE IN THAT EXECUTION OF THIS WORK SHALL BE REPAIRED OR RESTORED TO THE ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
8. DISCONNECTION OF UTILITIES:
   BEFORE STARTING JOB OPERATIONS, DISCONNECT OR ARRANGE FOR THE DISCONNECTION OF ALL UTILITIES TO BE REMOVED, PERFORMING ALL SUCH WORK IN ACCORDANCE WITH THE REQUIREMENTS OF THE UTILITY COMPANY OR AGENCY INVOLVED, AND WITH OWNER.
9. PROTECTION OF UTILITIES:
   - PRESERVE IN OPERATING CONDITION ALL ACTIVE UTILITIES REMAINING.
10. USE OF THE PREMISES: THE CONTRACTOR SHALL CONFINE HIS WORKMEN, AND THE PARKING OF WORKMEN'S VEHICLES TO LIMITS INDICATED BY LAW, ORDINANCE, PERMITS OR DIRECTION OF THE OWNER.
11. MATERIALS AND EMPLOYEES: UNLESS OTHERWISE DIRECTED BY THE OWNER, THE CONTRACTOR AND/OR SUBCONTRACTOR SHALL PROVIDE AND PAY FOR ALL MATERIALS, LABOR, TOOLS, EQUIPMENT, TELEPHONE, AND GAS TRANSPORTATION. MATERIALS SHALL BE OF GOOD QUALITY.
12. CLEANING UP: THE CONTRACTOR AND SUBCONTRACTORS SHALL AT ALL TIMES KEEP THE PREMISES FREE OF ACCUMULATIONS OF WASTE MATERIALS AND RUBBISH CAUSED BY HIS EMPLOYEES AND WORK. AT THE COMPLETION OF THE WORK, HE SHALL REMOVE ALL HIS RUBBISH, ALL OF HIS TOOLS, SCAFFOLDING AND SURPLUS MATERIALS FROM AND ABOUT THE BUILDING AND SHALL LEAVE HIS WORK IN A BROOM CLEAN CONDITION. THE SITE AND BUILDING AREA SHALL BE KEPT CLEAN AND PICKED UP OF DEBRIS AND SCRAPS AT ALL TIMES DURING CONSTRUCTION, PARTICULARLY AT THE END OF EACH WORK WEEK. THE CONTRACTOR SHALL INSURE THAT ALL GLASSES, TILES, TOILET FIXTURES, EQUIPMENT, PAINTED SURFACES, FLOORS, ETC., ARE THOROUGHLY PROTECTED DURING ALL CONDITIONS FOR ACCEPTANCE BY THE OWNER.
13. INTENT OF DRAWINGS: PLANS ARE INTENDED TO SHOW DETAILS FOR A COMPLETE PROJECT. PARTS AND DETAILS NOT FULLY SHOWN SHALL BE DETAILED AND EXECUTED ACCORDING TO STANDARD FIRST CLASS PRACTICE AND IN SIMILAR MANNER AND SPIRIT OF DETAILS WHICH ARE SHOWN. IF THE CONTRACTOR FINDS DETAILS WHICH IN HIS OPINION ARE UNSOUND OR NOT STANDARDS, IT IS HIS DUTY TO NOTIFY THE ARCHITECT OF THIS FACT. IF HE PERFORMS THE WORK AS DETAILED WITHOUT SAID NOTIFICATIONS, THEN IT SHALL BE ASSUMED THAT HE DOES NOT OBJECT TO DETAIL. REFER TO RELATED NOTE BELOW FOR ERRORS AND OMISSION
14. CLARIFICATION ON DRAWINGS: NOTE THAT DRAWINGS DO NOT SUPPORT TO SHOW ALL OBJECTS EXISTING ON THE JOB. BEFORE COMMENCING ANY DEMOLITION, VERIFY ALL OBJECTS TO BE REMOVED AND ALL OBJECTS TO BE PRESERVED.
15. DIMENSIONS: FIGURED DIMENSIONS SHALL BE FOLLOWED IN PREFERENCE TO SMALL SCALE DRAWINGS. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD BEFORE ANY WORK IS CONSTRUCTED AND/ OR FABRICATED. THE SPECIFICATION AND/OR SCHEDULES ON THE DRAWINGS SHALL HAVE WRITTEN NOTES AND OR BE FOLLOWED IN PREFERENCE TO INFORMATION FURNISHED IN THE FORM OF LINES ON DRAWINGS. DETAILED CLARIFICATION DRAWINGS FURNISHED DURING CONSTRUCTION OR APPROVED BY THE ARCHITECT ARE TO BE CONSIDERED EXPLANATORY AND NOT AS MODIFICATIONS OF THESE PLANS AS SHALL BE CALLED CLARIFICATION DRAWINGS. ALL NOTES, FIGURES AND DETAIL DRAWINGS SHALL BE FOLLOWED AND EXECUTED AS PART OF THESE NOTES.
16. ALL WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS. DIMENSION LINES ARE TO FACE OF STUD UNLESS NOTED OTHERWISE (U.N.O.)
17. PLEASE NOTE THAT ALL SPECIFIED MATERIALS ARE SUBJECT TO CHANGE UPON APPROVAL BY ALL PARTIES WITH AN EQUAL AND COMPARABLE ALTERNATE.

03 -CONCRETE WORK

1. REFER TO STRUCTURAL ENGINEERING CALCULATIONS AND THE MOST CURRENT SOILS REPORT FOR THE PERFORMANCE REQUIREMENTS FOR CONCRETE FOUNDATIONS.
2. CONCRETE STRENGTH SHALL BE PER CRC SECTION R402.2 AND TABLE R402.2 REFER TO STRUCTURAL ENGINEERING CALCULATIONS FOR ADDITIONAL INFORMATION.
3. CONCRETE SHALL BE MIXED IN ACCORDANCE WITH CRC SECTION **R404.1.3.3.2**.
4. CONCRETE PROPORTION SHALL BE PLACED IN ACCORDANCE WITH CRC SECTION **R404.1.3.3.4**.
5. CONCRETE SHALL BE CURED IN ACCORDANCE WITH CRC CHAPTER 44 A.C.I. 318-14.
6. ALL FORM WORK SHALL BE DESIGNED, CONSTRUCTED, UTILIZED, AND REMOVED PER CRC SECTION R404.1.3.3.6
7. CONDUIT, PIPES, OR SLEEVES MAY PENETRATE OR BE EMBEDDED IN CONCRETE ONLY IN ACCORDANCE WITH PER A.C.I. 318-14.
8. CONSTRUCTION JOINTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CRC SECTION **R404.1.3.3.7.8**
9. ALL STEEL REINFORCING OF CONCRETE SHALL BE DONE IN ACCORDANCE WITH CRC SECTION R404.1.3.3.7.1
10. TOP OF CONCRETE SLABS TO BE MINIMUM 6" (8" HUD) ABOVE FINISH GRADE. CRC SECTION R404.1.6
11. FOUNDATION WIDTHS, DEPTHS, AND REINFORCING, AS SHOWN ON PLANS, ARE SUPERCEDED BY ANY LOCAL CODES OR ORDINANCES WHICH REQUIRES INCREASES OF THE SAME.
12. ALL REINFORCEMENT, CONDUIT, OUTLET BOXES, ANCHORS, HANGERS, SLEEVES, BOLTS OR OTHER EMBEDDED MATERIALS AND ITEMS MUST BE SECURED AND APPROPRIATELY FASTENED IN THEIR PROPER LOCATIONS PRIOR TO THE PLACEMENT OF CONCRETE. SUB-CONTRACTOR SHALL VERIFY INSTALLATION OF HOLD-DOWNS. ANCHOR BOLTS, PA STRAPS, AND OTHER ANCHORAGE MATERIALS AND ITEMS PRIOR TO PLACEMENT OF CONCRETE.

04 -MASONRY

1. ANY AND ALL MATERIALS USED FOR THE CONSTRUCTION AND / OR INSTALLATION OF STONE OR MASONRY VENEER SHALL MEET THE QUALITY STANDARDS AS SET FORTH IN CRC SECTION R703.8
2. ALL MORTAR AND GROUT USED FOR THE CONSTRUCTION AND/OR INSTALLATION OF STONE OR MASONRY VENEER SHALL MEET THE REQUIREMENTS OF CRC SECTION R606.2.8 & R606.3.5.
3. WATER USED IN MORTAR OR GROUT SHALL BE CLEAN AND FREE OF DELETERIOUS AMOUNTS OF ACID, ALKALIS, OR ORGANIC MATERIAL OR OTHER HARMFUL SUBSTANCES
4. EXCEPT FOR MORTARS LISTED IN SECTION SR606.2.8. R606.2.9 AND R606.2.10, MORTAR FOR USE IN MASONRY CONSTRUCTION SHALL MEET THE PROPORTION SPECIFICATIONS OF TABLE R606.2.8. OR THE PROPERTY SPECIFICATION OF ASTM C270. THE TYPE OF MORTAR SHALL BE IN ACCORDANCE WITH SECTION R606.2.8.1., R606.2.8.2 AND R606.2.8.3 (CRC SECTION R606.2.8)
5. GROUT SHALL CONSIST OF CEMENTITIOUS MATERIAL AND AGGREGATE IN ACCORDANCE WITH ASTM C 476 OR THE PROPORTION SPECIFICATIONS OF TABLE R606.2.12 TYPE M OR TYPE S MORTAR TO WHICH SUFFICIENT WATER HAS BEEN ADDED TO PRODUCE POURING CONSISTENCY SHALL BE PERMITTED TO BE USED AS GROUT (CRC SEC R606.2.12)
6. CEMENT SHALL BE PORTLAND CEMENT CONFORMING TO ASTM C150-12
7. ALL BRICK SHALL CONFORM TO ASTM C1088-13 FOR SOLID UNITS OF THIN VENEER BRICK
8. UNLESS SPECIFICALLY SHOWN OTHERWISE ALL BRICK SHALL BE LAID IN A RUNNING BOND PATTERN.
9. MASONRY VENEER SHALL BE ANCHORED TO THE SUPPORTING WALL STUDS WITH CORROSION-RESISTANT METAL TIES EMBEDDED IN MORTAR OR GROUT AND EXTENDING INTO THE VENEER A MINIMUM OF 1 1/2 INCHES, WITH NOT LESS THAN 5/8 INCH MORTAR OR GROUT COVER TO OUTSIDE FACE. MASONRY VENEER SHALL CONFORM TO TABLE R703.8.4(I) (CRC SECTION R703.8.4) AS AN ALTERNATIVE TO THE AIRSPACE REQUIRED BY TABLE R703.8.4, GROUT SHALL BE PERMITTED TO FILL THE AIRSPACE. WHERE THE AIRSPACE IS FILLED WITH GROUT, A WATER-RESISTIVE BARRIER IS REQUIRED OVER STUDS OR SHEATHING. WHERE THE AIRSPACE IS FILLED, REPLACING THE SHEATHING AND WATER-RESISTIVE BARRIER WITH WIRE MESH AND APPROVED WATER RESISTIVE BARRIER-BACKED REINFORCEMENT ATTACHED DIRECTLY TO STUD IS PERMITTED. (CRC SECTION R703.8.4.2)
10. ADHERED MASONRY VENEER SHALL COMPLY WITH THE REQUIREMENTS OF SECTION R703.7.3 AND THE REQUIREMENTS IN SECTION 12.1 AND 12.3 OF TMS 402. ADHERED MASONRY VENEER SHALL BE INSTALLED IN ACCORDANCE WITH SECTION R703.7.1, ARTICLE 3.3C OF TMS 602 OR THE MANUFACTURER'S INSTRUCTIONS. (CRC SECTION R703.12)
    FLASHING SHALL BE LOCATED BENEATH THE FIRST COURSE OF MASONRY ABOVE FINISHED GROUND LEVEL ABOVE THE FOUNDATION WALL OR SLAB AND AT OTHER POINTS OF SUPPORT, INCLUDING STRUCTURAL FLOORS, SHELF, ANGLES AND LINTELS WHERE THE MASONRY VENEERS ARE DESIGNED IN ACCORDANCE WITH SECTION R703.8. SEE SECTION R703.4 FOR ADDITIONAL REQUIREMENT (CRC SECTION R703.7.5)
    WEEPHOLES SHALL BE PROVIDED IN THE OUTSIDE WYTHE OF MASONRY WALLS AT A MAXIMUM SPACING OF 33 INCHES ON CENTER. WEEPHOLES SHALL BE LOCATED IMMEDIATELY ABOVE THE FLASHING. (CRC SECTION R703.8.6)

05 -METALS

1. REFER TO STRUCTURAL NOTES AND SPECIFICATIONS FOR STRUCTURAL STEEL AND METAL AND REINFORCING STEEL SPECIFICATIONS
2. ALL STRUCTURAL STEEL SHALL CONFORM TO 2022 CRC; ANSI S100, AISI S200 AND ASTM C955 SEC. 8, AISI S220 AND ASTM C645, SEC. 10 AND AISI S230
   FOUNDATION ANCHORAGE. WOOD SILL PLATES AND WOOD WALLS SUPPORTED DIRECTLY ON CONTINUOUS FOUNDATION
   SHALL BE ANCHORED TO THE FOUNDATION IN ACCORDANCE TO CRC SECTION R403.1.6
3. FASTENERS FOR ALL PRESERVATIVE TREATED WOOD INCLUDING NUTS AND WASHERS SHALL BE OF HOT-DIPPED ZINC COATED GALVANIZED STEEL, STAINLESS STEEL, SILICON BRONZE OR COPPER.

06 -WOOD, PLASTIC & COMPOSITES

LUMBER

1. WOOD AND WOOD-BASE PRODUCTS USED FOR LOAD-SUPPORTING PURPOSES SHALL CONFORM TO BE APPLICABLE PROVISIONS OF CRC SECTION R302. SAWN LUMBER SHALL BE IDENTIFIED BY A GRADE MARK OF AN ACCREDITED LUMBER GRADING OR INSPECTION AGENCY AND HAVE DESIGN VALUES CERTIFIED BY AN ACCREDITATION BODY THAT COMPLIES WITH DOC PS20. IN LIEU OF A GRADE MARK, A CERTIFICATE OF INSPECTION ISSUED BY A LUMBER GRADING OR INSPECTION AGENCY MEETING THAT REQUIREMENTS OF THE FOLLOWING SECTION CRC SECTION R302.1, R602.1, R802.1
2. ALL PRESERVATIVE TREATED WOOD REQUIRED TO BE TREATED UNDER CRC SECTION R318.1 SHALL BEAR THE QUALITY MARK OF AN INSPECTION AGENCY WHICH HAS BEEN ACCREDITED BY AN ACCREDITATION BODY THAT COMPLIES WITH THE REQUIREMENTS OF THE AMERICAN LUMBER STANDARDS TREATED WOOD PROGRAM OR EQUIVALENT. THE QUALITY MARK SHALL BE ON A STAMPED OR LABEL AFFIXED TO THE PRESERVATIVE-TREATED WOOD. CRC SECTION R317.2
3. ALL LUMBER SIZES NOTED AND SPECIFIED ON PLANS ARE NOMINAL SIZES UNLESS SPECIFICALLY INDICATED AS NET SIZE

GLUE LAMINATED LUMBER

1. ALL GLUE LAMINATED TIMBER SHALL MEET THE STANDARDS OF QUALITY AND WORKMANSHIP AS STATED IN CRC SECTION R317.1 AND THE CURRENT EDITION OF THE TIMBER CONSTRUCTION MANUAL BY THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION
2. STRUCTURAL GLUE LAMINATED TIMBERS SHALL BE MANUFACTURED AND IDENTIFIED AS REQUIRED IN ANSI A190.1, ANSI 117 AND ASTM D 3737. (CRC SECTIONS R502.1.3 R602.1.3 AND R802.12)
3. REFER TO THE STRUCTURAL ENGINEER'S CURRENT NOTES, CALCULATIONS AND SPECIFICATIONS

PROTECTION AGAINST DECAY & TERMITE

1. ALL WOOD IN CONTACT WITH GROUND, EMBEDDED IN CONCRETE IN DIRECT CONTACT WITH THE GROUND OR EMBEDDED IN CONCRETE EXPOSED TO THE OCCUPANCY TO BE PROTECTION OF WOOD OR WOOD BASED PRODUCTS FROM DECAY SHALL BE PROVIDED IN THE LOCATIONS SPECIFIED IN SECTIONS R317.1 SHALL BE NATURALLY DURABLE WOOD OR PRESERVATIVE-TREATED IN ACCORDANCE WITH AWPA UI FOR SPECIES, PRODUCT PRESERVATIVE AND END USE PRESERVATIVES SHALL BE LISTED IN SECTION 4 OF AWPA UI-14.
2. WOOD JOIST OR THE BOTTOM OF WOOD STRUCTURAL FLOOR WHEN CLOSER THAN 18 INCHES, OR WOOD GIRDERS ARE CLOSER THAN 12 INCHES TO THE EXPOSED GROUND IN CRAWL SPACES OR UNEXCAVATED AREAS LOCATED WITHIN THE PERIPHERY OF THE BUILDING FOUNDATION. (CRC SECTION R317.1 (I)).
3. WOOD FRAMING MEMBERS THAT REST ON CONCRETE OR MASONRY EXTERIOR FOUNDATION WALLS AND ARE LESS THAN 8 INCHES FROM EXPOSED GROUND. (SEC R317.1 (2)). SILL AND SLEEPERS ON CONCRETE OR MASONRY SLAB THAT IS IN DIRECT CONTACT WITH GROUND UNLESS SEPARATED FROM SUCH SLAB BY AN IMPERVIOUS MOISTURE BARRIER. (CRC SEC R317.1 (3)).
4. END OF WOOD GIRDERS ENTERING EXTERIOR MASONRY OR CONCRETE WALLS HAVING CLEARANCES OF LESS THAN 1/2 INCH ON TOPS, SIDES, AND ENDS. (SECTIONS R317.1 (4)).
5. WOOD SIDING, SHEATHINGS AND WALL FRAMING ON THE EXTERIOR OF A BUILDING HAVING CLEARANCES OF LESS THAN 6 INCHES FROM THE GROUND OR LESS THAN 2 INCHES MEASURED VERTICALLY FROM CONCRETE STRESS, PORCH SLABS, PATIO SLABS, AND SIMILAR HORIZONTAL SURFACES EXPOSED TO WEATHER. (CRC SEC R317 (5)).
6. WOOD STRUCTURAL MEMBERS SUPPORTING MOISTURE-PERMEABLE FLOORS OR ROOFS THAT ARE EXPOSED TO THE WEATHER, SUCH AS CONCRETE OR MASONRY SLABS, UNLESS SEPARATED FROM WHICH FLOORS OR ROOFS BY AN IMPERVIOUS MOISTURE BARRIER. (SEC R317.1 (6)) WOOD FURRING STRIPS OR OTHER WOOD FRAMING MEMBERS ATTACHED DIRECTLY TO THE INTERIOR OF EXTERIOR MASONRY OR CONCRETE WALLS BELOW GRADE EXCEPT WHERE AN APPROVED VAPOR RETARDER IS APPLIED BETWEEN THE WALL AND THE FURRING STRIPS OR FRAMING MEMBERS (SEC R317.7 (7)).
7. IN GEOGRAPHICAL AREAS WHERE EXPERIENCE HAS DEMONSTRATED A SPECIFIC NEED, APPROVED NATURALLY DURABLE OR PRESSURE-PRESERVATIVE-TREATED WOOD SHALL BE USED FOR THOSE PORTIONS OF WOOD MEMBERS THAT FORM THE STRUCTURAL SUPPORTS OF BUILDINGS, BALCONIES, PORCHES OR SIMILAR PERMANENT BUILDING APPURTENANCES WHEN THOSE MEMBERS ARE EXPOSED TO THE WEATHER WITHOUT ADEQUATE PROTECTION FROM A ROOF, EAVE, OVERHANG OR OTHER COVERING THAT WOULD PREVENT MOISTURE OR WATER ACCUMULATION ON THE SURFACE OR AT JOINTS BETWEEN MEMBERS. MAY INCLUDE SUCH MEMBERS
   - A. HORIZONTAL MEMBERS SUCH AS GIRDERS, JOIST AND DECKING
   - B. VERTICAL MEMBERS SUCH AS POSTS, POLES, AND COLUMNS
   - C. BOTH HORIZONTAL AND VERTICAL MEMBERS
8. WOOD COLUMNS SHALL BE APPROVED WOOD OF NATURAL DECAY RESISTANCE OR APPROVED PRESSURE PRESERVATIVE TREATED WOOD. (CRC SECTION R317.1.4)

SHEATHING

1. WOOD STRUCTURAL PANEL WALL SHEATHING SHALL CONFORM TO DOS PS I OR DOC PS 2 OR ANSI/APA PRP 210 CSA 0437 OR CSA 0325. PANELS SHALL BE IDENTIFIED BY A GRADE MARK OR CERTIFICATE OF INSPECTION ISSUED BY AN APPROVED AGENCY (SEC R604.1)
2. WOOD STRUCTURAL PANEL USED AS ROOF SHEATHING SHALL CONFORM TO REQUIREMENTS OF CRC SECTION 803.2
3. REFER TO THE STRUCTURAL ENGINEER'S CURRENT SPECIFICATIONS CALCULATIONS AND PLANS FOR REQUIRED STRENGTH, GRADE, AND THICKNESS FOR WOOD STRUCTURAL PANEL ROOF SHEATHING AND FOR DIAPHRAGM NAILING.
4. REFER TO THE STRUCTURAL ENGINEER'S CURRENT SPECIFICATIONS, CALCULATIONS AND PLANS FOR REQUIRED STRENGTH, GRADE, AND THICKNESS FOR THICKNESS FOR PLYWOOD FLOOR SHEATHING PANELS AND FOR DIAPHRAGM NAILING AND ADHESIVE REQUIREMENTS
5. WHERE APPLICABLE, REFER TO THE SHEAR WALL SCHEDULE FOR REQUIRED STRENGTH, GRADE, AND THICKNESS OF PLYWOOD SHEAR PANELS AND FOR REQUIRED SHEAR WALL NAILING SCHEDULE

FLOOR FRAMING

1. REFER TO THE STRUCTURAL ENGINEER'S CURRENT PLAN & CALCULATIONS FOR SIZE, SPACING AND ANCHORAGE OF ALL FLOOR JOISTS - SIZE, LOCATION, AND ANCHORAGE OF ALL FLOOR BEANS AND HEADERS, AND ALL RELATED FRAMING ISS

1. ***INSULATION*** MATERIALS, INCLUDING FACINGS, SUCH AS VAPOR RETARDERS AND VAPOR-PERMEABLE MEMBRANES INSTALLED WITHIN FLOOR-CEILINGS ASSEMBLIES, ROOF CEILING ASSEMBLIES, WALL ASSEMBLIES, CRAWL SPACES, AND ATTICS SHALL HAVE A FLAME SPREAD INDEX NOT TO EXCEED 25 WITH AN ACCOMPANYING SMOKE-DEVELOPED INDEX NOT TO EXCEED 150 WHERE TESTED IN ACCORDANCE WITH ASTM E84 OR UL 723. EXCEPTIONS: WHEN SUCH MATERIALS ARE INSTALLED IN CONCEALED SPACES, THE FLAME SPREAD INDEX AND SMOKE-DEVELOPED INDEX LIMITATIONS DO NOT APPLY TO THE FACINGS, PROVIDED THAT THE FACING IS INSTALLED IN SUBSTANTIAL CONTACT WITH UNEXPOSED SURFACE OF THE CEILING, FLOOR OR WALL FINISH (CRC SEC R302.10.1 EXCP)
2. DUCT INSULATION AND INSULATION IN PLENUMS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT CALIFORNIA MECHANICAL CODE
3. BATTS OR BLANKETS OF MINERAL OR GLASS FIBER OTHER APPROVED NON-RIGID MATERIAL SHALL BE PERMITTED FOR FORMING INSULATION WITH FOOT HORIZONTAL FIRE BLOCKING IN WALLS CONSTRUCTED USING PARALLEL ROWS OF STUDS OR STAGGERED STANCE. (CRC SECTION ARE 302.1 1.1.1)
4. FOR PROJECTS WITHIN CALIFORNIA TO ENERGY EFFICIENCY REQUIREMENTS, INCLUDING BUT NOT LIMITED TO INSULATION "R" VALUES, PERCENTAGE OF GLAZING, GLAZING "U" VALUES, ETC. SHALL BE DETERMINED BY THE CALIFORNIA ENERGY CODE. A PART OF TITLE 24 AND LOCATED IN THE PLANS ON THE ENERGY COMPLIANCE SHEETS(S) (CFI – R) (MANDATORY MEASURES) PREPARED IN ACCORDANCE WITH STATE CODES ARE ALSO REQUIRED AS PART OF THE BUILDING DEPARTMENT SUBMITTAL
5. FOR PROJECTS WITHIN CALIFORNIA BUILDER AND INSULATION INSTALLER MUST PROVIDE A CERTIFICATE OF INSULATION AND POST IT IN CONSPICUOUS LOCATION FOR CALIFORNIA STATE ENERGY CODE
6. THE ENERGY REQUIREMENTS FOR PROJECTS OUTSIDE CALIFORNIA SHALL BE BASED ON MODEL ENERGY CODE OR INTERNATIONAL ENERGY CONSERVATION CODE. REFER TO LOCAL JURISDICTION.
7. THE FOLLOWING OPENINGS IN THE BUILDING ENVELOPE MUST BE CAULKED SEALED OR WEATHERSTRIP TO PROTECT AGAINST COLD AIR, INFILTRATION OR HEAT LOSS:
   A. EXTERIOR JOINTS AROUND WINDOW AND DOOR FRAMES, BETWEEN WALL PANELS, WALL, WALL SOLE PLATES AND FLOORS
   B. AND INTERIOR WALLS, CEILINGS AND FLOORS; OPENINGS FOR PLUMBING, ELECTRICAL AND GAS LINES IN EXTERIOR OPENINGS IN THE ATTIC FLOOR, (SUCH AS WERE CEILING, PANELS ME INTERIOR AND EXTERIOR WALLS)
   C. ALL OTHER SUCH OPENINGS IN THE BUILDING ENVELOPE.

ROOFING MATERIALS

1. ROOFING MATERIAL SHALL BE CLASS "A" UNLESS OTHERWISE APPROVED BY OWNER / BUILDER
2. THE QUALITY AND DESIGN OF ROOFING MATERIALS AND THEIR FASTENINGS SHALL CONFORM TO THE APPLICABLE STANDARDS LISTED IN CRC SECTION R905.3 (FOR CLAY & CONCRETE TILE)
3. CLAY OR CONCRETE TILE SHALL COMPLY WITH CRC STANDARD R905.3.5 ALL MATERIAL SHALL BE DELIVERED IN PACKAGES BEARING THE MANUFACTURER'S LABEL OR IDENTIFYING MARK. (CRC SECTION R904.4)
4. COMPOSITION ROOFING SHINGLES SHALL BE OF ASPHALT OR APPROVED RELATED MATERIALS AND MEET THE REQUIREMENTS OF CRC SECTION R905.2
5. ASPHALT SHALL BE DELIVERED IN CARTONS BEARING THE NAME OF THE MANUFACTURER'S IDENTIFYING MARKS AND APPROVED TESTING AGENCY LABELS REQUIRED. BULK SHIPMENTS SHALL BE ACCOMPANIED BY THE SAME INFORMATION ISSUED IN THE FORM OF A CERTIFICATE OR ON A BILL OF LADING BY THE MANUFACTURER (CRC SECTION R904.4)
6. ASPHALT SHINGLES SHALL BE FASTENED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS, BUT NOT LESS THAN FOUR FASTENERS PER STRIP SHINGLE OR TWO FASTENERS PER INDIVIDUAL SHINGLE (CRC SECTION R905.2.6
7. CLAY OR CONCRETE ROOF TILES INSTALLATION SHALL COMPLY WITH THE PROVISIONS OF CRC SECTION R905.3. UNDERLAYMENT SHALL COMPLY WITH SECTION 905.1.1. AND TYPE AND CLASSIFICATION INDICATED ON TABLE R905.1.1(1). UNDER-LAYMENT SHALL BE APPLIED PER TABLE R905.1.1(2) AND ATTACHED PER TABLE 905.1.1(3)
8. TYPE, COLOR, AND PROFILE OF ALL ROOFING TILES SHALL BE APPROVED BY OWNER / /BUILDER AND ARCHITECT
9. BUILT-UP ROOFING FLY MATERIALS SHALL BEAR THE LABEL OF AN APPROVED AGENCY HAVING A SERVICE FOR THE INSPECTION OF MATERIAL AND FINISHED PRODUCTS DURING MANUFACTURE. (CRC SECTION R904.4)
10. BUILT-UP ROOFING SHALL BE INSTALLED ACCORDING TO SECTION R905.9 AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND (CRC SECTION R905.9.3).

08 -OPENINGS

1. SEE OPENING SCHEDULE FOR SIZES AND TYPES OF DOOR AND WINDOWS, AND FOR ANY DIVIDED LITE PATTERNS. COLORS SHALL BE APPROVED BY THE OWNER/BUILDER.
2. EGRESS DOOR SHALL BE SIDE HINGE SWINGING, AND SHALL PROVIDE A CLEAR WIDTH NO LESS THAN 32 INCHES AND SHOULD OPEN DIRECTLY INTO A PUBLIC WAY, OR YARD OR COURT THAT OPENS TO A PUBLIC WAY. EXCEPTION: PRIVATE GARAGE AND DOORS WITHIN OR SERVING A SINGLE DWELLING UNIT IN GROUPS R –2 AND R-3.(CRC SECTION R311.)
3. THE DOOR FROM THE GARAGE TO THE HOUSE SHALL BE SOLID WOOD DOORS NO LESS THAN 1 3/8 INCHES AND THICKNESS, SOLID OR HONEYCOMB CORE STEEL. DOORS NO LESS THAN 1 3/8 INCHES THICK OR 20 MINUTES FIRE RATED DOORS. EQUIPPED WITH A SELF CLOSING OR AUTOMATIC CLOSING AND SELF LATCHING DEVICE. (CRC SECTION R302.5.1.)
4. PROVIDE SECURITY HARDWARE FOR ALL DOORS AND WINDOWS IN CONFORMANCE WITH ALL STATE AND LOCAL CODE REQUIREMENTS.
5. ALL AUTOMATIC GARAGE DOOR OPENERS IF PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH YOU UL325. SEE HEALTH AND SAFETY CODE SECTION 19890 AND 19891 FOR ADDITIONAL PROVISIONS FOR RESIDENTIAL GARAGE DOOR OPENERS.(CRC SECTION R309.4.)
6. ALL SLIDING OR SWINGING DOORS AND WINDOWS OPENING TO THE EXTERIOR OR TO UNCONDITIONAL AREA SHALL BE FULLY WEATHER-STRIPPED, GASKETED, OR OTHERWISE TREATED TO LIMIT AIR INFILTRATION.
7. ALL MANUFACTURED WINDOWS AND SLIDING GLASS DOORS SHALL MEET AIR INFILTRATION STANDARDS OF THE CURRENT AMERICAN NATIONAL STANDARDS INSTITUTE, ASTM. E283–73 WITH A PRESSURE DIFFERENTIAL OF 1.57 POUNDS PER SQUARE FOOT, AND SHALL BE CERTIFIED AND LABELED.
8. ESCAPE OR RESCUE WINDOW SHALL HAVE A NET CLEAR OPENING NOT LESS THAN 5.7 SQUARE FEET. THE NET CLEAR HEIGHT OPENING SHALL NOT BE LESS THAN 24 INCHES AND THE NET CLEAR FOR WIDTH NO LESS THAN 20 INCHES. THE NET CLEAR OPENING DIMENSIONS REQUIRED TO BE OBTAINED BY THE NORMAL OPERATION OF THE EMERGENCY ESCAPE AND RESCUE OPENING FROM THE INSIDE THE WINDOW SHALL HAVE THE BOTTOM OF THE CLEAR OPENING NOT GREATER THAN 44 INCHES MEASURED FROM THE FLOOR. (CRC SECTIONS R310.2; I. R310.2.2)
9. BARS, GRILLES, COVERS, SCREENS OR SIMILAR DEVICES ARE PERMITTED TO BE PLACED OVER EMERGENCY ESCAPE AND RESCUE OPENINGS, BULKHEAD, ENCLOSURES, OR WINDOW WELLS THAT SERVES SUCH OPENINGS, PROVIDED THE MINIMUM NET CLEAR OPENING SIZE COMPLIES WITH SECTION R310.1.1 AND SUCH DEVICES SHALL BE RELEASABLE OR R310 2.3 REMOVABLE FROM THE INSIDE WITHOUT THE USE OF A KEY, TOOL, SPECIAL KNOWLEDGE, OR FORCE, GREATER THAN THAT WHICH IS REQUIRED FOR NORMAL OPERATION OF THE ESCAPE AND RESCUE OPENING. THE RELEASE MECHANISM FOR NORMAL OPERATION OF THE ESCAPE AND RESCUE OPENINGS. THE RELEASE MECHANISM SHALL BE MAINTAINED OPERABLE AT ALL TIMES.
   A. SUCH BARS, GRILLS, GRATES, OR ANY SIMILAR DEVICES SHALL BE EQUIPPED WITH AN APPROVED EXTERIOR RELEASE DEVICE FOR USE BY THE FIRE DEPARTMENT ONLY WHEN REQUIRED BY AUTHORITY JURISDICTION
   WHERE SECURITY BARS, (BURGLAR BARS) ARE INSTALLED ON EMERGENCY EGRESS AND RESCUE WINDOWS OR DOOR SUCH DEVICES SHALL COMPLY WITH CALIFORNIA BUILDING STANDARDS, CODE, PART 12, CHAPTER 12–3, AND OTHER APPLICABLE PROVISIONS OF THIS CODE (CRC SECTION R310.4)
10. ALL HABITABLE ROOMS, WITH THE EXCEPTION OF KITCHEN, SHALL HAVE AGGREGATE GLAZING AREA OF NOT LESS THAN 8 PERCENT OF THE FLOOR AREA OF SUCH ROOMS. NATURAL VENTILATION, SHALL BE THROUGH WINDOWS, DOORS, LOUVERS, OR OTHER APPROVED OPENINGS TO THE OUTDOOR AIR. SUCH OPENING SHALL BE PROVIDED READY ACCESS, OR SHALL OTHERWISE BE READILY CONTROLLED BY THE BUILDING OCCUPANTS. (CRC SEC. R303.1)
11. ALL HABITABLE ROOMS MINIMUM OPENABLE AREA TO THE OUTDOOR SHOWER BE 4 PERCENT OF THE FLOOR AREA BEING VENTLESS. (CRC SECTION R303.1.) THE GLAZED AREAS NEED NOT BE OPENABLE WHERE THE OPENINGS IS NOT REQUIRED BY SECTION R310 AND A WHOLE HOUSE MECHANICAL VENTILATION SYSTEM IS INSTALLED IN ACCORDANCE WITH THE CALIFORNIA MECHANICAL CODE CRC SECTION R303.1 EXCEPTION 1.
12. BATHROOMS, WATER CLOSET, COMPARTMENTS, AND OTHER SIMILAR ROOMS BE PROVIDED WITH AGGREGATED GLAZING AREAS IN WINDOWS OF NOT LESS THAN 3 SQUARE FEET ONE-HALF OF WHICH MUST BE OPENABLE (CRC SECTION R303.3.)
13. SEE THE MECHANICAL AND PLUMBING SECTION OF THESE NOTES FOR MECHANICAL ALTERNATIVES TO THE NATURAL VENTILATION REQUIREMENTS OF CRC SECTION R303

GLAZING

1. GLAZING SUBJECT TO HUMAN IMPACT SHALL COMPLY WITH CRC SECTION R308
2. EXCEPT AS INDICATED IN SECTION R308.1.1 EACH PANE OF GLAZING INSTALLED IN HAZARDOUS LOCATION AS DEFINED IN SECTION R308.4 SHALL BE PROVIDED WITH THE MANUFACTURES DESIGNATION SPECIFYING WHO APPLIED THE DESIGNATION, DESIGNATING THE TYPE OF GLASS, AND THE SAFETY GLAZING® STANDARD WITH WHICH IT COMPLIES, WHICH IS VISIBLE IN THE FINAL INSTALLATION. THE DESIGNATION TYPE SHALL BE OF A TYPE WHICH ONCE APPLIED CANNOT BE REMOVED WITHOUT BEING DESTROYED. A LABEL SHALL BE PERMITTED IN LIEU OF MANUFACTURES DESIGNATION (CRC SECTION R308.1.)
3. THE FOLLOWING SHALL BE CONSIDERED SPECIFIC HAZARDOUS LOCATIONS FOR THE PURPOSES OF GLAZING:
   A. GLAZING IN FIX AN OPERABLE PANELS OF SWINGING, SLIDING AND BIFOLD DOORS, EXCEPT LOUVERED WINDOWS AND JALOUSIES PER SECTION R308.3 EXCEPTION 1
   B. GLAZING IN FIXED, OR OPERABLE PANELS ADJACENT TO A DOOR SHALL BE CONSIDERED HAZARDOUS LOCATION WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60 INCHES ABOVE THE FLOOR, OR WALKING SURFACE AND MEETS THE FOLLOWING CONDITIONS:
      a. GLAZING IS WITHIN 24 INCHES OF EITHER SIDE OF THE DOOR IN THE PLANE OF THE DOOR IN A CLOSED POSITION
      b. WHERE THE GLAZING IS ON THE WALL LESS THAN 180 DEGREES FROM THE PLANE OF THE DOOR IN A CLOSED POSITION AND WITHIN 24 INCHES OF THE HINGE SIDE OF IN SWINGING DOOR
   C. GLAZING IN FIXED OR OPERABLE PANEL THAT MEETS ALL CONDITIONS:
      a. EXPOSED AREA OF AN INDIVIDUAL PANE GREATER THAN 9 SQ. FT.
      b. EXPOSED BOTTOM EDGE LESS THAN 18 INCHES ABOVE THE FLOOR
      c. EXPOSED TOP EDGE, GREATER THAN 36 INCHES ABOVE THE FLOOR
      d. ONE OR MORE WALKING SERVICES WITHIN 36 INCHES MEASURED HORIZONTALLY AND IN A STRAIGHT LINE OF GLAZING
   D. GLAZING IN GUARDS AND RAILINGS, INCLUDING STRUCTURAL BALUSTER, PANELS, AND NONSTRUCTURAL INFILL PANELS, REGARDLESS OF AREA OR HEIGHT ABOVE A WALKING SURFACE.
   E. GLAZING IN WALLS, ENCLOSURES OR FENCES CONTAINING OR FACING HOT TUBS, SPA, WHIRLPOOLS, SAUNAS, STEAM ROOMS, BATHTUBS, SHOWERS INDOORS OR OUTDOOR SWIMMING POOLS WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60 INCHES MEASURED VERTICALLY ABOVE ANY STANDING OR WALKING SURFACE.
   F. GLAZING ADJACENT TO THE STAIRWAYS AND RAMPS WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 36 INCHES ABOVE THE PLANE OF THE ADJACENT WALKING SURFACE OF STAIRWAYS, LANDINGS BETWEEN FLIGHTS OF STAIRS AND RAMPS.
   G. GLAZING ADJACENT TO THE LANDING AT THE BOTTOM OF THE STAIRWAY WHERE THE GLAZING IS LESS THAN 36 INCHES ABOVE THE LANDING AND WITHIN 60 INCHES HORIZONTAL ARC LESS THAN 180 DEGREES FROM THE BOTTOM TREAD NOSING.

GLAZING (CONT.)

   H. GLAZING IN ALL UNFRAMED SWINGING DOORS
   I. GLAZING IN STORM DOORS
   (CRC SECTION R309.4) SEE SECTION FOR EXCEPTIONS
5. GLAZING IN WARDROBE DOOR SHALL MEET THE IMPACT TEST REQUIREMENTS FOR SAFETY GLAZING AS SET FORTH IN THE CRC TABLES R308.1(1) AND OUR 308.3.1(2) PLASTIC GLAZING SHALL MEET THE WEATHERING REQUIREMENTS OF ANSI Z97.1.
6. MIRROR SHALL BE A MINIMUM OF 3/16 INCH POLISHED PLATE GLASS
7. REGULAR, FLOAT, WIRED AND PATTERN GLASS IN JALOUSIES AND LOUVERED WINDOW SHALL BE, NOT LESS THAN NOMINAL 3/16 INCH AND NOT MORE THAN 48 INCH IN LENGTH. EXPOSED GLASS EDGES SHALL BE SMOOTH. (CRC SECTION R308.2)
8. GLAZING SUPPORT AND FRAMING SHALL COMPLY WITH CBC SECTIONS 2403.2 AND 2403.3
9. HINGED SHOWER DOOR SHALL OPEN OUTWARD
10. GLAZING SHALL BE IN ACCORDANCE WITH ENERGY COMPLIANCE CALCULATIONS, CALIFORNIA ENERGY CODE (TITLE 24).

09 -FINISHES

GYPSUM BOARD

1. GYPSUM WALLBOARD SHALL BE INSTALLED IN CONFORMANCE WITH THE CURRENT EDITION OF THE CALIFORNIA BUILDING CODE AND ALL STATE AND LOCAL BUILDING CODES. THE MOST STRINGENT REQUIREMENT SHALL GOVERN.
2. GYPSUM WALLBOARD SHALL NOT BE INSTALLED UNTIL WEATHER PROTECTION FOR THE INSTALLATION IS PROVIDED. EXTERIOR SHEATING SHALL BE DRY BEFORE APPLYING EXTERIOR COVER. (CRC SECTION R701.2)
3. ALL EDGES AND ENDS OF GYPSUM WALLBOARD SHALL OCCUR ON THE FRAMING MEMBERS, EXCEPT THOSE EDGES AND ENDS THAT ARE PERPENDICULAR TO THE FRAMING MEMBERS (CRC SECTION R702.3.5)
4. GYPSUM BOARD AND GYPSUM PANEL PRODUCTS SHALL BE INSTALLED PERPENDICULAR TO CEILING FRAMING MEMBERS. END JOINTS OF ADJACENT COURSES OF BOARD AND PANELS SHALL NOT OCCUR ON THE SAME JOIST. (CRC SECTION R702.3.6)
5. FASTENERS SHALL BE SPACED, NOT MORE THAN 7 INCHES ON CENTER AT ALL SUPPORTS, INCLUDING PERIMETER, BLOCKING, AND NOT LESS THAN 3/8 INCH FROM THE EDGES AND ENDS OF THE GYPSUM BOARD (CRC SECTION R702.3.6 (D))
6. SCREWS FOR ATTACHING GYPSUM BOARD AND GYPSUM PANEL PRODUCTS TO WOOD FOR FRAMING SHALL BE TYPE W OR TYPE S AND SHALL COMPLY WITH ASTM C1002 AND SHALL PENETRATE THE WOOD NOT LESS THAN 5/8 INCH (CRC SECTION R702.3.5.1)
7. SUPPORTS AND FASTENERS USED TO ATTACH GYPSUM BOARD AND GYPSUM PANEL PRODUCT SHALL COMPLY WITH TABLE R702.3.5. (CRC SECTION R702.3.5)
8. WHERE TWO LAYERS OF GYPSUM WALLBOARD ARE REQUIRED, THE BASE LAYER OF GYPSUM WALLBOARD SHALL BE APPLIED WITH FASTENERS OF THE TYPE AND SIZE AS REQUIRED FOR THE NON-ADHESIVE APPLICATION OF SINGLE PLY GYPSUM WALLBOARD
9. MATERIALS USED AS BACKERS FOR WALL TILE IN TUB AND SHOWER AREA AND WALL PANELS IN SHOWER AREA. SHALL BE OF MATERIAL LISTED IN THE TABLE R702.4.2 AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. (CRC SECTION R702.4.2)
10. WATER RESISTANT GYPSUM BACKING BOARD USED ON BASE OR BACKER FOR ADHESIVE APPLICATION OF CERAMIC TILE OR OTHER REQUIRED NONABSORBENT FINISH MATERIAL SHALL CONFIRM TO ASTM C1396, C1178, OR C1278. USE OF WATER RESISTANT GYPSUM, BACKING BOARD SHALL BE PERMITTED ON CEILINGS. CUT OR EXPOSED EDGES, INCLUDING THOSE AT WALL INTERSECTIONS SHALL BE SEALED AS RECOMMENDED BY MANUFACTURER (CRC SECTION R702.3.7).
11. WATER RESISTANT GYPSUM, WALLBOARD SHALL NOT BE USED IN FOLLOWING LOCATIONS:
   A. OVER A CLASS I OR II VAPOR RETARDER IN SHOWER OR TUB COMPARTMENT
   B. IN AREAS WHERE THERE WILL BE DIRECT EXPOSURE TO WATER, OR AN AIR IS SUBJECT TO CONTINUOUS HUMIDITY. (CRC SECTION R702.3.7 & R702.3.7.1)

METAL LATH

1. ALL LATH AND LATH ATTACHMENTS SHALL BE OF CORROSION RESISTANT MATERIAL
2. BACKING OR A LATH SHALL PROVIDE SUFFICIENT RIGIDITY TO PERMIT PLASTER APPLICATION
3. ALL LATH AND LATH ATTACHMENTS SHALL BE OF CORROSION RESISTANT MATERIALS. EXPANDED METAL OR WOVEN WIRE LATCH SHALL BE ATTACHED WITH 1 1/2 INCH LONG, II GAGE NAILS HAVING A 7/16 INCH HEAD OR 7/8 INCH LONG, 16 GAGE STAPLES, SPACED NO MORE THAN 6 INCHES OR AS OTHERWISE (CRC SECTION R703.7.1)
4. GYPSUM LATH OR GYPSUM BOARD SHALL NOT BE USED AS BACKING, EXCEPT THAT ON HORIZONTAL SUPPORTS OF CEILING OR ROOF SOFFITS. IT MAY BE USED AS BACKING FOR METAL LATH, OR WIRE, FABRIC LATH AND CEMENT PLASTER.
5. METAL LATH OR WIRE FABRIC LATH SHALL BE APPLIED WITH A LONG DIMENSION OF THE SHEETS PERPENDICULAR TO SUPPORTS.
6. WHERE END LAPS OF SHEET DO NOT OCCUR OVER SUPPORTS, THEY SHOULD BE SECURELY TIED TOGETHER WITH NOT LESS THAN 0.049 INCH. (NO. 18 BW GAGE) WIRE .
7. CORNERITE SHALL BE INSTALLED IN ALL THE INTERNAL CORNERS TO RETAIN POSITION DURING PLASTERING. CORNERITE MAY BE OMITTED WHEN LATH IS CONTINUOUS OR WHEN PLASTER IS NOT CONTINUOUS FROM ONE PLANE TO AN ADJACENT PLANE.
8. THE APPLICATION OF METAL LATH OR WOVEN WIRE LATH SHALL BE AS SPECIFIED AND CRC SECTION R703.7.1
9. WHERE NO EXTERNAL CORNER OF REINFORCEMENT IS USED, LATH SHALL BE FURRED OUT AND CARRIED AROUND CORNERS AT LEAST ONE SUPPORT ON FRAME CONSTRUCTION .
10. WEEP SCREED, A MINIMUM 0.019 INCH (NO. 26 GALVANIZED SHEET GAGE) CORROSION RESISTANT WEEP SCREED WITH A MINIMUM VERTICAL ATTACHMENT FLANGE OF 3 1/2 INCHES SHALL BE PROVIDED AT OR BELOW THE FOUNDATION PLATE LINE ON EXTERIOR STUD WALLS IN ACCORDANCE WITH ASTM C926. THE WEEP SCREED SHALL BE PLACED NOT LESS THAN 4 INCHES ABOVE THE EARTH, OR 2 INCHES ABOVE PAVED AREA IS AND SHALL BE OF A TYPE THAT WILL ALLOW TRAPPED WATER TO DRAIN THE EXTERIOR OF THE BUILDING. THE WEATHER RESISTANT BARRIER SHALL LAP THE ATTACHMENT FLANGE. THE EXTERIOR LATH SHALL COVER AND TERMINATE ON THE ATTACHMENT FLANGE OF WEEP SCREED (CRC SEC R703.7.2.1).

CEMENT PLASTERING

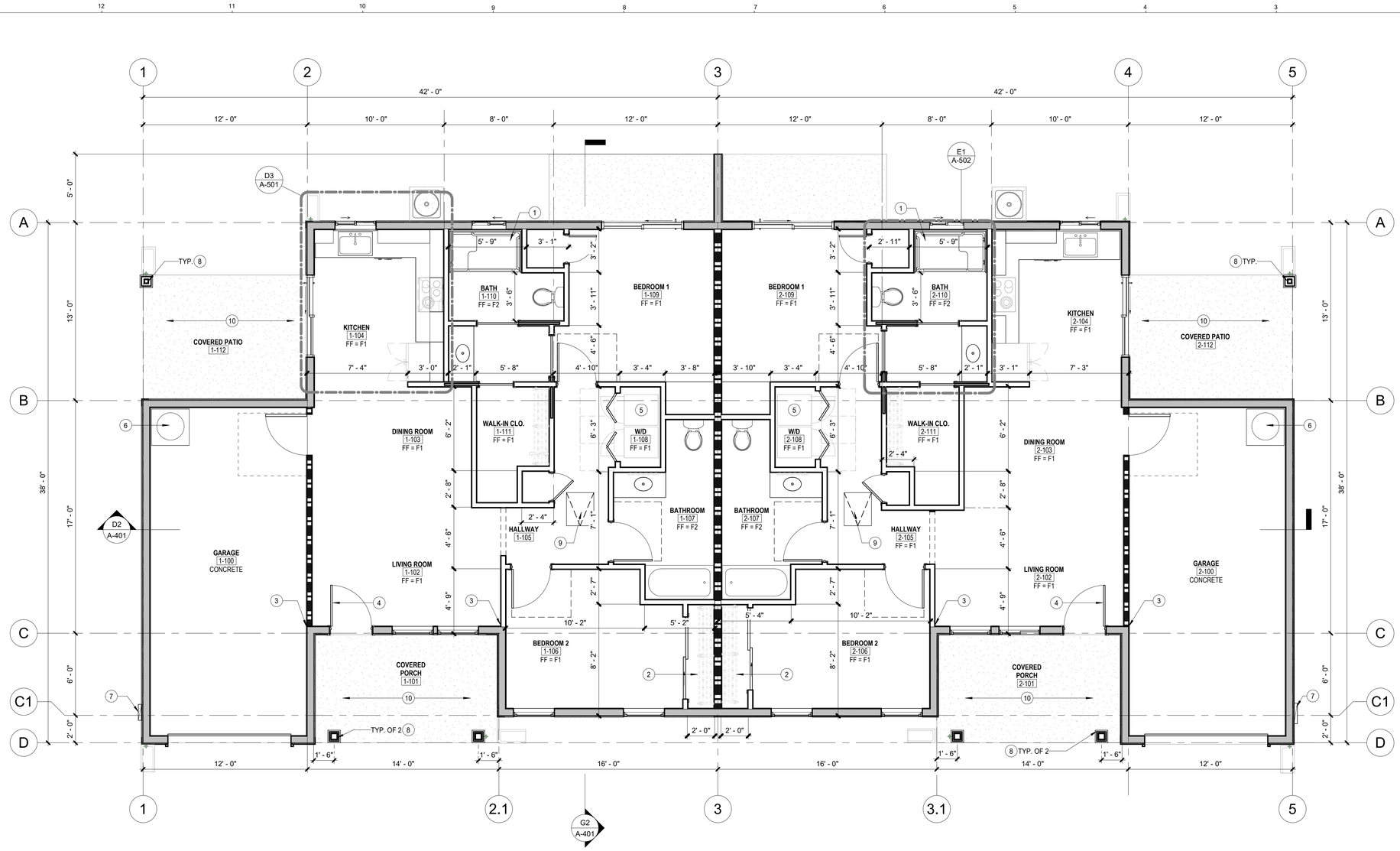
1. PLASTERING WITH PORTLAND CEMENT PLASTER SHALL NOT BE LESS THAN THREE COATS WHEN APPLIED OVER METAL LATH OR WIRE LATH, AND SHALL NOT BE LESS THAN TWO COATS WHEN APPLIED OVER MASONRY, CONCRETE OR GYPSUM BACKING AS SPECIFIED (CRC SEC R703.7.2)
2. ON WOOD FRAME OR STEEL STUD CONSTRUCTION WITH AN ON-GRADE CONCRETE FLOOR SLAB SYSTEM, EXTERIOR PLASTER SHALL BE APPLIED TO COVER, BUT NOT EXTEND BELOW, LATH, PAPER, AND SCREED. PAPER THE APPLICATION OF LATH, PAPER AND FLASHING OR DRIP SCREEDS SHALL COMPLY WITH ASTM C926, AND ASTM C1063. (CRC SEC R703.7)
3. ONLY APPROVED PLASTICITY AGENTS AND APPROVED AMOUNTS THEREOF MAY BE ADDED TO PORTLAND CEMENT. WHEN PLASTIC CEMENT OR MASONRY CEMENT IS USED, NO ADDITIONAL LIME OR PLASTICISER SHALL BE ADDED. HYDRATED LIME, OR THE EQUIVALENT AMOUNT OF LINE PUTTY USED AS PLASTICISER IS PERMITTED TO BE ADDED TO CEMENT, PLASTER OR CEMENT IN LIME PLASTER IN AN AMOUNT NOT TO EXCEED THAT SET FORTH IN ASTM C926. (CRC SEC R702.1 (3))
4. GYPSUM PLASTER SHALL NOT BE USED ON EXTERIOR SURFACES.
5. THE PROPORTION OF AGGREGATED TO CEMENTITIOUS MATERIALS FOR BASE COAT OF EXTERIOR PLASTER SHALL BE A SET FORTH IN ASTM C926 AND TABLE R702.1(3)
6. CEMENT PLASTER MATERIALS SHALL CONFORM TO ASTM C91. (TYPE M, S OR N), C150 (TYPE I, II AND III) C595 (TYPE IP, I (PM), IS AND I (SM)), C847, C897, C926, C1032, C1047, AND C1328, AND SHALL BE INSTALLED OR APPLIED IN CONFORMANCE WITH ASTM C1063. GYPSUM LATH SHALL CONFORMS TO ASTM C1396. PLASTER SHALL NOT BE LESS THAN THREE COATS WHERE APPLIED OVER METAL LATH AND NOT LESS THAN TWO COATS WHERE APPLIED OVER OTHER BASES PERMITTED BY THIS SECTION, EXCEPT THAT VENEER PLASTER SHALL BE APPLIED IN ONE COAT NOT TO ACCEPT 3/16 INCH THICKNESS PROVIDED THE TOTAL THICKNESS IS IN ACCORDANCE WITH TABLE OR R702.1(1) (CRC SEC R702.2.2 / R702.2.1)
7. APPLICATIONS INSTALLED IN ACCORDANCE WITH ASTM C926. EACH COAT SHALL BE KEPT MOIST CONDITION FOR AT LEAST 48 HOURS PRIOR TO APPLICATION OF THE NEXT COAT. (CRC SEC R703.7.4)
8. THE FINISH COAT FOR TWO-COAT CEMENT PLASTER SHALL NOT BE APPLIED SOONER THAN SEVEN DAYS AFTER APPLICATION OF THE FIRST COAT. FOR THREE-COAT CEMENT PLASTER, THE SECOND COAT SHALL NOT BE APPLIED SOONER THAN 48 HOURS AFTER APPLICATION OF THE FIRST COAT. THE FINISH COAT FOR THREE-COAT CEMENT PLASTER SHALL NOT BE APPLIED SOONER THAN SEVEN DAYS AFTER APPLICATION OF THE SECOND COAT. (CRC SEC R703.7.3)
9. COLOR AND FINISH TO BE SELECTED AND APPROVED BY OWNER / BUILDER.
10. A ONE-COAT EXTERIOR PLASTER SYSTEM "OMEGA DIAMOND WALL" AND DIAMOND WALL INSULATING EXTERIOR STUCCO SYSTEM ICC NO. ESR-1194 OR APPROVED OR EQUAL MAY BE USED IN LIEU OF THE 3-COAT EXTERIOR PLASTER SYSTEM.
11. FOAM INSULATION BOARD USED IN ONE-COAT EXTERIOR PLASTER SYSTEM SHALL CONFORM TO THE REQUIREMENTS CRC CHAPTER 7.
12. THE EXTERIOR OF THE BUILDING SHALL BE SEPARATED FROM THE FOAM PLASTIC INSULATION BY AN APPROVED THERMAL BARRIER. WATER-RESISTIVE BARRIER SHALL COMPLY WITH R703.2 ASTM E2570 (CRC R703.9.2(4). INSTALLATION OF WATER RESISTIVE BARRIER SHALL BE APPLIED BETWEEN THE EIFS AND THE WALL SHEATHING. (CRC R703.9.2(5)

21 -FIRE SEPARATION

1. PRIVATE GARAGE SHALL BE SEPARATED FROM THE DWELLING UNIT AND IT 'S ATTIC AREA BY MEANS OF A MINIMUM 1/2 INCH GYPSUM BOARD APPLIED TO THE GARAGE SIDE FOR TABLE R302.6. OPENINGS IN GARAGE WALLS SHALL COMPLY WITH SECTION R302.5 ATTACHMENT OF GYPSUM BOARD SHALL COMPLY WITH TABLE R702.3.5. (CRC SECTION R302.6)
2. PROVIDE ONE LAYER OF 5/8 INCH 'X' GYPSUM WALLBOARD AT GARAGE CEILING, SIDE, AND BENEATH ALL HABITABLE ROOMS AND STRUCTURAL SUPPORTING FRAMING MEMBERS (CRC SECTION R702.3.7)
3. ENCLOSED ACCESSIBLE SPACE UNDER STAIRS SHALL HAVE WALLS, UNDER STAIRS SURFACE AND ANY SOFFITS PROTECTED ON ENCLOSED SIDE, 1/2" GYPSUM BOARD (CRC SECTION R302.7)

22 -PLUMBING

1. ALL MATERIALS AND EQUIPMENT, INSTALLATION AND CONSTRUCTION METHODS SHALL COMPLY WITH THE MOST CURRENT ADOPTED EDITION OF THE CALIFORNIA PLUMBING CODE, OR THE CURRENT LOCALLY ADOPTED PLUMBING CODE.
2. NO PLUMBING FIXTURE, DEVICE, OR CONSTRUCTION SHALL BE INSTALLED OR MAINTAINED OR SHALL BE CONNECTED TO ANY DOMESTIC WATER SUPPLY WHEN SUCH INSTALLATION OR CONNECTION MAY PROVIDE A POSSIBILITY OF POLLUTING SUCH WATER SUPPLY OR MAY PROVIDE A CROSS-CONNECTION BETWEEN A DISTRIBUTING SYSTEM OF WATER FOR DRINKING AND DOMESTIC PURPOSES AND WATER WHICH MAY BECOME CONTAMINATED BY SUCH PLUMBING FIXTURES, DEVICE, OR CONSTRUCTION, UNLESS THERE IS PROVIDED A BACKFLOW PREVENTION DEVICE APPROVED FOR THE POTENTIAL HAZARD (CPC SECTION 602.3)
3. WHERE PLUMBING FIXTURES ARE INSTALLED FOR PRIVATE USE HOT WATER SHALL BE REQUIRED FOR BATHING, WASHING, LAUNDRY, COOKING PURPOSES, DISHWASHING OR MAINTENANCE (CPC SECTION 601.2)
4. PORTABLE WATER OUTLETS WITH HOSE ATTACHMENT, OTHER THAN WATER HEATER DRAINS AND CLOTHES WASHER CONNECTIONS SHALL BE PROTECTED BY A LISTED NON-REMOVAL HOSE BIB TYPE BACKFLOW, PREVENTER, NON-REMOVABLE, HOSE BIB TYPE VACUUM BREAKER, OR AN ATMOSPHERIC VACUUM BREAKER INSTALLED NOT LESS THAN 6 INCHES ABOVE HIGHEST POINT OF USAGE LOCATED ON DISCHARGE SIDE OF THE LAST VALVE IN CLIMATES WHERE FREEZING TEMPERATURES OCCUR. A LISTED SELF-DRAINING, FROST-PROOF HOSE BIB WITH AN INTEGRAL BACKFLOW PREVENTER OR VACUUM BREAKER SHALL BE USED (CPC SECTION 603.5.7)
5. COPPER OR COPPER ALLOY TUBE FOR WATER PIPING SHALL HAVE WEIGHT, NOT LESS THAN TYPE L. EXCEPTION: TYPE M COPPER OR COPPER ALLOY TUBING SHALL BE PERMITTED TO BE USED FOR WATER PIPING WHERE PIPING IS ABOVEGROUND IN OR ON A BUILDING OR UNDERGROUND OUTSIDE OF STRUCTURES (CPC SECTION 604.3)
6. APPROVED PLASTIC MATERIALS SHALL BE PERMITTED TO BE USED IN BUILDING SUPPLY PIPING, PROVIDED THAT WHERE METAL BUILDING SUPPLY PIPING IS USED FOR ELECTRICAL GROUNDING PURPOSES, REPLACEMENT PIPING THERE OF SHALL BE OF LIKE MATERIALS. (CPC SECTION 604.3)
7. PIPING PASSING UNDER OR THROUGH WALLS SHALL BE PROTECTED FROM BREAKAGE PIPING, PASSING THROUGH OR UNDER CINDERS OR OTHER CORROSIVE MATERIALS SHALL BE PROTECTED FROM EXTERNAL CORROSION IN ANY APPROVED MATTER. APPROVED PROVISION SHALL BE MADE FOR EXPANSION OF HOT WATER PIPING. VOIDS AROUND CONCRETE FLOORS ON THE GROUND SHALL BE APPROPRIATELY SEALED (CPC SECTION 312.1)
8. PIPING IN CONNECTION WITH PLUMBING SYSTEM SHALL BE INSTALLED SO THAT PIPING OR CONNECTION WILL NOT BE SUBJECT TO UNDER STRAINS OR STRESSORS AND PROVISION SHALL BE MADE FOR EXPANSION, CONTRACTION, AND STRUCTURAL SETTLEMENT. NO PLUMBING PIPING SHALL BE DIRECTLY EMBEDDED IN CONCRETE OR MASONRY. NO STRUCTURAL MEMBERS SHALL BE SERIOUSLY WEEKEND OR IMPAIRED BY CUTTING NOTCHING OR OTHERWISE (CPC SECTION 312.2
9. PROTECTIVELY, COATED PIPE, OR TUBING SHALL BE INSPECTED AND TESTED, AND ANY VISIBLE VOID DAMAGE OR IMPERFECTION TO THE PIPE COATING SHALL BE REPAIRED IN AN APPROVED MANNER
10. NO WATER, SOIL, OR WASTE PIPE SHALL BE INSTALLED OR PERMITTED OTHERWISE OF A BUILDING, AN ATTIC OR CRAWL SPACES, OR IN AN EXTERIOR WALL, UNLESS WERE NECESSARY ADEQUATE PROVISION IS MADE TO PROTECT SUCH PIPE FROM FREEZING (CPC SECTION 312.6)
11. ALL PIPING PENETRATIONS OF FIRE RESISTANCE RATED WALLS, PARTITIONS, FLOORS, FLOOR/CEILING, ASSEMBLIES, ROOF/CEILING, ASSEMBLIES, OR SHAFT REQUIREMENTS SHALL BE PROTECTED IN ACCORDANCE WITH THE REQUIREMENTS OF CALIFORNIA BUILDING CODE IN CALIFORNIA RESIDENTIAL CODE (CPC SECTION 312.7)
12. MATERIALS FOR DRAINAGE PIPING SHALL BE IN ACCORDANCE WITH ONE OF THE REFERENCED STANDARDS IN TABLE 701.2 (CPC SEC 701.2) ABS AND PVC DMV PIPING INSTALLATIONS SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE STANDARD REFERENCED IN TABLE 1701.2 AND THE FIRESTOP PRO



FINISH LEGEND

FLOOR FINISHES (FF)	
F1	LUXURY VINYL TILES
F2	CERAMIC TILES OPTION: FLOOR FINISH WITH NON-ABSORBENT SURFACE FROM FINISH FLOOR TO MINIMUM OF 6' A.F.F.

CONDITIONED SPACE (UNIT 1)	986 SF
OPTIONAL COVERED PATIO (UNIT 1)	109 SF
GARAGE (UNIT 1)	310 SF
COVERED PORCH (UNIT 1)	105 SF
TOTAL	1510 SF

CONDITIONED SPACE (UNIT 2)	986 SF
OPTIONAL COVERED PATIO (UNIT 2)	109 SF
GARAGE (UNIT 2)	310 SF
COVERED PORCH (UNIT 2)	105 SF
TOTAL	1510 SF

WALL LEGEND

2x6 EXTERIOR WALL ASSEMBLY. REFER TO A1 / A-803 AND A-801 FOR ADDITIONAL INFORMATION.

TYP. INTERIOR PARTITION WALL. 1/2" GYP. BOARD EACH SIDE OF 2X4 STUDS @ 16" O.C. TYPICAL INTERIOR WALL PARTITION, U.N.O. REFER TO A5 / A-803 FOR ADDITIONAL INFORMATION.
** FOR BATHROOM WALLS:*
Fiber-cement, fiber-mat reinforced cement, glass mat gypsum backers or fiber-reinforced gypsum backers in compliance with ASTM C 1288, C1325, C 1178 or C 1278, respectively, and installed in accordance with manufacturers' recommendations shall be used as backers for wall tile in tub and shower areas and wall panels in shower areas.

2x6 INTERIOR STUD WALL (60 MINUTES FIRE RESISTANCE RATING). REFER TO G1 / A-803 FOR ADDITIONAL INFORMATION. SEPARATION BETWEEN UNITS. TYPICAL; U.O.N.

2x4 INTERIOR STUD WALL (60 MINUTES FIRE RESISTANCE RATING). REFER TO G5 / A-803 FOR ADDITIONAL INFORMATION. SEPARATION BETWEEN GARAGE AND INTERIOR; TYPICAL U.O.N.

01
DOOR
REFER TO A-601 FOR ADDITIONAL INFORMATION.

1t
WINDOW
REFER TO A-601 FOR ADDITIONAL INFORMATION.

FLOOR PLAN KEYNOTES

1. ADAPTABLE ROLL-IN SHOWER. MAINTAIN A 2% MAXIMUM SLOPE IN ALL DIRECTIONS. TYPICAL ON ALL SHOWER AND BATHROOMS. REFER TO A6 / A-502 FOR ADDITIONAL INFORMATION.
2. BUILT-IN CLOSET/DRAWERS WITH CLOTHES ROD. PROVIDE 50% OF STORAGE AT 48" HIGH MAX. FROM FINISH FLOOR.
3. ALIGN WITH EDGE OF WALL FOR A SMOOTH AND FLUSHED FINISHED.
4. PROVIDE PEEP HOLE OR VISION PANEL AT 1 PEEPHOLE AT 43" MAX. (OPTIONS PEEPHOLE @ MAX. 60" O.C. AFF). PROVIDE STEEL PLATE AT THE DEAD BOLT STRIKER. SOLID SHIM 6" ABOVE & BELOW WITH 2/8 BY 2" SCREWS.
5. WASHING MACHINES AND CLOTHES DRYERS. DRYER SHALL HAVE 4" VENT DUCT TO EXTERIOR WITH MAXIMUM RUN OF 14' INCLUDING 2-90° ELBOWS. TWO FEET SHALL BE DEDUCTED FOR EACH 90 DEGREE ELBOW IN EXCESS OF TWO. REFER TO E5 / A-805 FOR ADDITIONAL DETAIL.
   NOTE: WASHING MACHINES AND CLOTHES DRYERS SHALL BE FRONT LOADING. THE BOTTOM OF THE OPENING TO THE LAUNDRY COMPARTMENT SHALL BE LOCATED 15 INCHES MINIMUM AND 36 INCHES MAXIMUM ABOVE THE FINISH FLOOR. 2022 CBC 1127A.10.4
6. 50 GAL. HEAT PUMP WATER HEATER. (MINIMUM OF 3.2 UEF PER TITLE 24). INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
7. NEW SERVICE PANEL. COORDINATE WITH POWER AND GAS COMPANY PROVIDER PRIOR TO COMMENCING WORK. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
8. POST WITH OPTIONAL 2X POST WRAP. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
9. MIN. 24" X 36" ATTIC ACCESS PANEL. "ATTIC ACCESS DOORS SHALL HAVE PERMANENTLY ATTACHED INSULATION USING ADHESIVE OR MECHANICAL FASTENERS. THE ATTIC ACCESS SHALL BE GASKETED TO PREVENT AIR LEAKAGE; AND WHEN LOOSE-FILL INSULATION IS INSTALLED, THE MINIMUM INSTALLED WEIGHT PER SQUARE FOOT SHALL CONFORM WITH THE INSULATION MANUFACTURER'S INSTALLED DESIGN WEIGHT PER SQUARE FOOT AT THE MANUFACTURER'S LABELED R-VALUE." **2022 CEC 160.1**
10. CONCRETE PATIO/LANDING. SLOPED AT 2% MAXIMUM AWAY FROM THE BUILDING. REFER TO A1 / A-801 FOR ADDITIONAL INFORMATION.

FLOOR PLAN GENERAL NOTES:

1. VERIFY ALL DIMENSIONS, GRADES, AND OTHER CONDITIONS AT JOB SITE BEFORE COMMENCING WORK. DIMENSIONS SHOWN ON THESE PLANS ARE FROM FACE OF FINISH, UNLESS OTHERWISE NOTED.
2. WEATHER-STRIP ALL EXTERIOR DOORS AND WINDOWS CERTIFIED ACCORDING TO SECTION 2-555 OF STANDARD FOR DOORS AND WINDOWS.
3. ALL OPENINGS AROUND DUCTING. GAS VENTS, PIPES, CHIMNEYS AT THE CEILING SHALL BE FIRE BLOCKED PER CBC AND CRC.
4. ALL WINDOWS AND DOORS SHALL MEET THE AIR INFILTRATION STANDARDS OF THE **2022** CALIFORNIA RESIDENTIAL AND ENERGY CODES SHALL BE CERTIFIED AND LABELED.
5. INTERIOR WALL COVERING TO BE 1/2" THK. GYP. BRD., UNLESS OTHERWISE NOTED. (FLAME SPREAD CLASS 111)
6. ALL WINDOW GLAZING ARE TO BE DUAL-GLAZED AND PROVIDE SOLAR SCREENS.
7. GLASS DOORS AND WINDOWS IMMEDIATELY TO OR LESS THAN 18" FROM FLOOR OR IN DOOR SHALL BE TEMPERED.
8. THE FOLLOWING SHALL BE CAULKED OR OTHERWISE SEALED TO LIMIT AIR INFILTRATION:
   A. EXTERIOR JOINTS AROUND WINDOWS AND DOOR FRAMES, BETWEEN WALLS SOLE PLATES AND FLOORS AND BETWEEN WALL PANELS.
   B. OPENING FOR PLUMBING, ELECTRICITY, AND GAS LINES IN WALLS, CEILINGS AND FLOORS.
   C. OPENINGS IN THE ATTIC FLOOR (SUCH AS WHERE CEILING PANELS MEET INTERIOR AND EXTERIOR WALLS AND MASONRY FIREPLACES.)
9. PROVIDE 2x SOLID BLOCKING BEHIND ALL TOILET FIXTURES, CABINETS, WATER HEATER, CEILING LIGHT FIXTURES (FUTURE FAN LOCATION) AND WHEREVER DIRECTED BY THE OWNER, INSPECTOR OR ARCHITECT.
10. DUCT CONSTRUCTED, INSTALLED AND INSULATED PER CURRENT CODE AND TITLE 24.
11. MECHANICAL VENTILATION SYSTEMS MUST SUPPLY **5 CHANGES PER HOUR IN BATHROOMS AND LAUNDRY ROOMS: 2 AIR CHANGES PER HOUR** IN OTHER HABITABLE ROOMS.
12. PROVIDE 1-1/2" DUCT INSULATION (TYPICAL).
13. VERIFY ALL APPLIANCE SPECIFICATIONS, SIZES AND OWNER'S REQUIREMENT FOR BUILT-IN ASSEMBLY PRIOR TO PRODUCTION OF CASEWORKS. ADJUST DIMENSIONS OF BUILT IN CASEWORK WITH APPLIANCE DIMENSION.
14. CONSTRUCT PATIO SLABS WITH 4" THK. CONCRETE X 12" DP. SHOVEL (1 #4 BAR) FOOTING AT PERIMETER. SLABS ARE TO BE BROOM FINISH. PROVIDE 6x6x10 /10 WWM IN MIDDLE OF SLABS.
15. THE ENERGY CERTIFICATION OF COMPLIANCE MUST BE SUBMITTED AFTER INSTALLATION OF THE REQUIRED EQUIPMENT AND/OR MATERIAL AND PRIOR TO REQUEST OF FINAL INSPECTION.
16. PROVIDE 115V OUTLET (W.P., GFI) WITHIN 25 FEET OF ROOF MOUNTED EQUIPMENT.
17. AFTER INSTALLING INSULATION, THE INSTALLER SHALL POST IN A CONSPICUOUS LOCATION IN THE BUILDING A CERTIFICATE SIGNED BY THE INSTALLER AND THE BUILDER STATING THAT THE INSTALLATION CONFORM WITH THE REQUIREMENTS FOR TITLE 24 PART 2, CHAPTER 2-53 AND THAT THE MATERIALS INSTALLED CONFORM WITH THE REQUIREMENTS OF TITLE 20, CHAPTER 2 SUB-CHAPTER 4, ARTICLE 3. THE CERTIFICATE SHALL STATE THE MANUFACTURER'S NAME AND MATERIAL IDENTIFICATION, THE INSTALLED "R" VALUE, AND (IN APPLICATIONS OF LOOSE FILL INSULATION) THE MINIMUM INSTALLED WEIGHT PER SQUARE FOOT CONSISTENT WITH THE MANUFACTURER'S LABEL DENSITY FOR THE DESIRED "R" VALUE TO BE INSTALLED IN CEILING AND IN WALLS.
18. WALL AND CEILING FINISHES SHALL HAVE A FLAME SPREAD INDEX OF NOT GREATER THAN 200. **CRC R302.9.1**
19. WALL AND CEILING FINISHES SHALL HAVE A SMOKED-DEVELOPED INDEX OF NOT GREATER THAN 450. **CRC R302.9.2**
20. PROVIDE DOOR CHIME / BELL ON EACH UNIT AT 48" MAX. AFF. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.

DOOR LANDING NOTES

1. LANDING SHALL HAVE A WIDTH NOT LESS THAN THE WIDTH OF THE DOOR AND 36" MIN. IN THE DIRECTION OF TRAVEL. (CBC 1008.1.5)
2. PER CBC 1008.1.6 BELOW:

"1008.1.6 THRESHOLDS. THRESHOLDS AT DOORWAYS SHALL NOT EXCEED 0.75 INCH IN HEIGHT FOR SLIDING DOORS SERVING DWELLING UNITS OR 0.5 INCH FOR OTHER DOORS. RAISED THRESHOLDS AND FLOOR LEVEL CHANGES GREATER THAN 0.25 INCH AT DOORWAYS SHALL BE BEVELED WITH A SLOPE NOT GREATER THAN ONE UNIT VERTICAL IN TWO UNITS HORIZONTAL (50-PERCENT SLOPE).
EXCEPTION: THE THRESHOLD HEIGHT SHALL BE LIMITED TO 7.75 INCHES WHERE THE OCCUPANCY IS GROUP R-2 OR R-3, THE DOOR IS AN EXTERIOR DOOR THAT IS NOT A COMPONENT OF THE REQUIRED MEANS OF EGRESS; THE DOOR, OTHER THAN AN EXTERIOR STORM OR SCREEN DOOR DOES NOT SWING OVER THE LANDING OR STEP; AND THE DOORWAY IS NOT ON AN ACCESSIBLE ROUTE AS REQUIRED BY CHAPTER 11A OR 11B AND IS NOT PART OF AN ADAPTABLE OR ACCESSIBLE DWELLING UNIT."

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

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NO. C-32283
RENEWAL DATE 06/30/2025
STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

PROPOSED (DUPLEX) FLOOR PLAN

SCALE 1/4" = 1'-0"

A-201

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

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PROPOSED DUPLEX FLOOR PLAN 1/4" = 1'-0" **A2**

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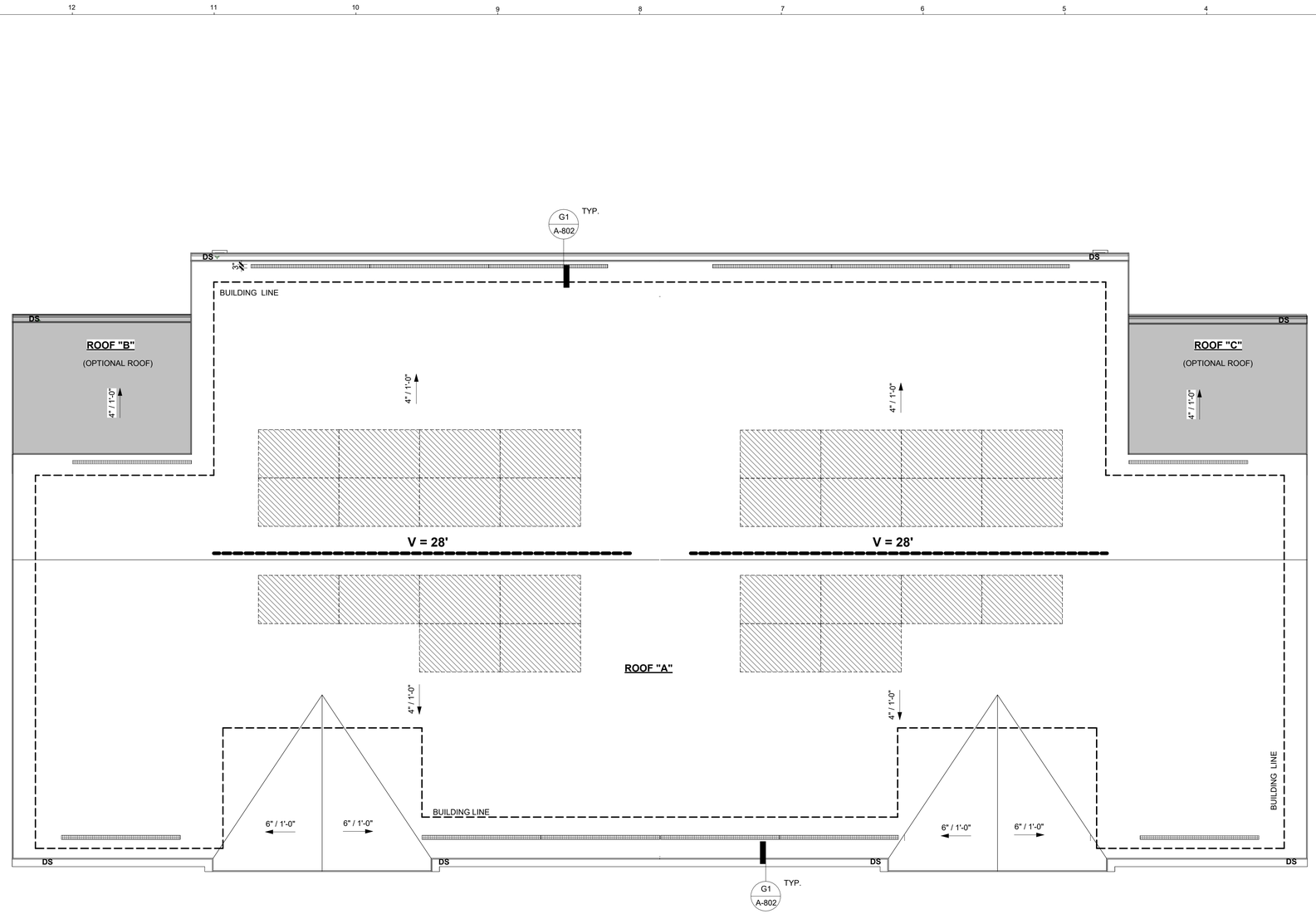
24" X 36"



ATTIC VENTILATION CALCULATION

ROOF "A"
996 SF x 2 = 1992 SF / 150 = 13.28 SQ. FT. = 1912.32 SQ. IN.
1912.32 SQ. IN. @ 50% UPPER AND LOWER NFVA =
956.16 SQ. IN.

RIDGE VENT:
USE OMNI RIDGE PRO VENT (PRO4-N)
MANUFACTURER'S DATA:
NFVA = 18 SQ. IN. / L.F.

4956.16 SQ.IN.-L.F. / 18 SQ. IN.
= 53.12 L.F. (REQUIRED)

PROVIDE = 56 L.F.
= 1008 NFVA

SOFFIT VENT:
LOMANCO MODEL 105 CONTINUOUS VINYL SOFFIT VENT
MANUFACTURER'S SIZE = 22.75" X 8'
N.F.V. = 72 SQ. IN. / 8' FT. 9 SQ.IN./L.F.

REQUIRED: 956.16 IN^2 - LF / 9 IN^2 = 106.24 L.F.

PROVIDE: (14) 2.75" X 8' = 112 L.F. @ 9 SQ.IN./L.F.
= 1008 NFVA

NOTES:
1. AIR SPACE REQUIRED FOR VENTILATION IS ≥ 1" BETWEEN THE INSULATION AND THE ROOF SHEATHING.
2. PROVIDE VAPOR RETARDER WITH A TRANSMISSION RATE OF ≤ 1 PERM.
3. PROVIDE 1/4" MESH AT ALL VENTS, INCLUDING CONTINUOUS VENTS.
4. **R8** INSULATED DUCTS

ROOF "B" AND ROOF "C"

UNVENTED PER R806.5 CONDITION #2:
" Interior Class I vapor retarders are not installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly."

ROOF PLAN LEGEND

V = – – – – – ROOF VENT. SEE ATTIC VENTILATION CALCULATION FOR ADDITIONAL INFORMATION

INLET BALANCING VENT. SEE ATTIC VENTILATION CALCULATION FOR ADDITIONAL INFORMATION.

DS — 2" x 3" POWDER COATED - 24GA. DOWNSPOUT w/ STRAP @ 60" O.C. MAX.

PROPOSED SOLAR ZONE AREA
2022 CEC SECTION 110.10.(B)B.

POTENTIAL SOLAR ZONE AREA. = 15 PERCENT OF THE TOTAL ROOF AREA OF THE BUILDING EXCLUDING ANY SKYLIGHT AREA
ROOF AREA = 1992 SQ.FT. ROOF AREA @ 15% = 298.7

PROVIDE MINIMUM 300 SQ.FT. SOLAR ZONE AREA FOR FUTURE SOLAR INSTALLATION

SOLAR ZONE GENERAL NOTES

1. AZIMUTH RANGE. ALL SECTIONS OF THE SOLAR ZONE LOCATED ON STEEP-SLOPED ROOFS SHALL HAVE AN AZIMUTH RANGE BETWEEN 90 DEGREES AND 300 DEGREES OF TRUE NORTH.
2. SHADING.
   A. NO OBSTRUCTIONS, INCLUDING BUT NOT LIMITED TO, VENTS, CHIMNEYS, ARCHITECTURAL FEATURES AND ROOF MOUNTED EQUIPMENT, SHALL BE LOCATED IN THE SOLAR ZONE.
   B. ANY OBSTRUCTION, LOCATED ON THE ROOF OR ANY OTHER PART OF THE BUILDING THAT PROJECTS ABOVE A SOLAR ZONE SHALL BE LOCATED AT LEAST TWICE THE DISTANCE, MEASURED IN THE HORIZONTAL PLANE, OF THE HEIGHT DIFFERENCE BETWEEN THE HIGHEST POINT OF THE OBSTRUCTION AND THE HORIZONTAL PROJECTION OF THE NEAREST POINT OF THE SOLAR ZONE, MEASURED IN THE VERTICAL PLANE.

EXCEPTION TO SECTION 110.10(B)3: ANY ROOF OBSTRUCTION, LOCATED ON THE ROOF OR ANY OTHER PART OF THE BUILDING, THAT IS ORIENTED NORTH OF ALL POINTS ON THE SOLAR ZONE.

3. STRUCTURAL DESIGN LOADS ON CONSTRUCTION DOCUMENTS. FOR AREAS OF THE ROOF DESIGNATED AS SOLAR ZONE, THE STRUCTURAL DESIGN LOADS FOR ROOF DEAD LOAD AND ROOF LIVE LOAD SHALL BE CLEARLY INDICATED ON THE CONSTRUCTION DOCUMENTS.

NOTE: SECTION 110.10(B)4 DOES NOT REQUIRE THE INCLUSION OF ANY COLLATERAL LOADS FOR FUTURE SOLAR ENERGY SYSTEMS.

4. INTERCONNECTION PATHWAYS.
   A. THE CONSTRUCTION DOCUMENTS SHALL INDICATE A LOCATION RESERVED FOR INVERTERS AND METERING EQUIPMENT AND A PATHWAY RESERVED FOR ROUTING OF CONDUIT FROM THE SOLAR ZONE TO THE POINT OF INTERCONNECTION WITH THE ELECTRICAL SERVICE.
   B. FOR SINGLE-FAMILY RESIDENCES AND CENTRAL WATER-HEATING SYSTEMS, THE CONSTRUCTION DOCUMENTS SHALL INDICATE A PATHWAY FOR ROUTING OF PLUMBING FROM THE SOLAR ZONE TO THE WATER-HEATING SYSTEM.
5. DOCUMENTATION. A COPY OF THE CONSTRUCTION DOCUMENTS OR A COMPARABLE DOCUMENT INDICATING THE INFORMATION FROM SECTIONS 110.10(B) THROUGH 110.10(C) SHALL BE PROVIDED TO THE OCCUPANT.
6. MAIN ELECTRICAL SERVICE PANEL.
   A. THE MAIN ELECTRICAL SERVICE PANEL SHALL HAVE A MINIMUM BUSBAR RATING OF 200 AMPS.
   B. THE MAIN ELECTRICAL SERVICE PANEL SHALL HAVE A RESERVED SPACE TO ALLOW FOR THE INSTALLATION OF A DOUBLE POLE CIRCUIT BREAKER FOR A FUTURE SOLAR ELECTRIC INSTALLATION. THE RESERVED SPACE SHALL BE PERMANENTLY MARKED AS "FOR FUTURE SOLAR ELECTRIC".
7. SOLAR ZONE.
   1. MINIMUM SOLAR ZONE AREA. THE SOLAR ZONE SHALL HAVE A MINIMUM TOTAL AREA AS DESCRIBED BELOW. THE SOLAR ZONE SHALL COMPLY WITH ACCESS, PATHWAY, SMOKE VENTILATION, AND SPACING REQUIREMENTS AS SPECIFIED IN TITLE 24, PART 9 OR OTHER PARTS OF TITLE 24 OR IN ANY REQUIREMENTS ADOPTED BY A LOCAL JURISDICTION. THE SOLAR ZONE TOTAL AREA SHALL BE COMPRISED OF AREAS THAT HAVE NO DIMENSION LESS THAN FIVE FEET AND ARE NO LESS THAN 80 SQUARE FEET EACH FOR BUILDINGS WITH ROOF AREAS LESS THAN OR EQUAL TO 10,000 SQUARE FEET OR NO LESS THAN 160 SQUARE FEET EACH FOR BUILDINGS WITH ROOF AREAS GREATER THAN 10,000 SQUARE FEET.

      A. MULTIFAMILY BUILDINGS, HOTEL/MOTEL OCCUPANCIES AND NONRESIDENTIAL BUILDINGS. THE SOLAR ZONE SHALL BE LOCATED ON THE ROOF OR OVERHANG OF THE BUILDING OR ON THE ROOF OR OVERHANG OF ANOTHER STRUCTURE LOCATED WITHIN 250 FEET OF THE BUILDING OR ON COVERED PARKING INSTALLED WITH THE BUILDING PROJECT, AND SHALL HAVE A TOTAL AREA NO LESS THAN 15 PERCENT OF THE TOTAL ROOF AREA OF THE BUILDING EXCLUDING ANY SKYLIGHT AREA. THE SOLAR ZONE REQUIREMENT IS APPLICABLE TO THE ENTIRE BUILDING, INCLUDING MIXED OCCUPANCY.

DUPLEX DWELLING UNIT

OPTION #1

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DUPLEX
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PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

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RENEWAL DATE
06/30/2025
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UPDATE

JAN. 02, 2024

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TITLE

PROPOSED ROOF PLAN

SCALE 1/4" = 1'-0"

A-202

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

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

A3

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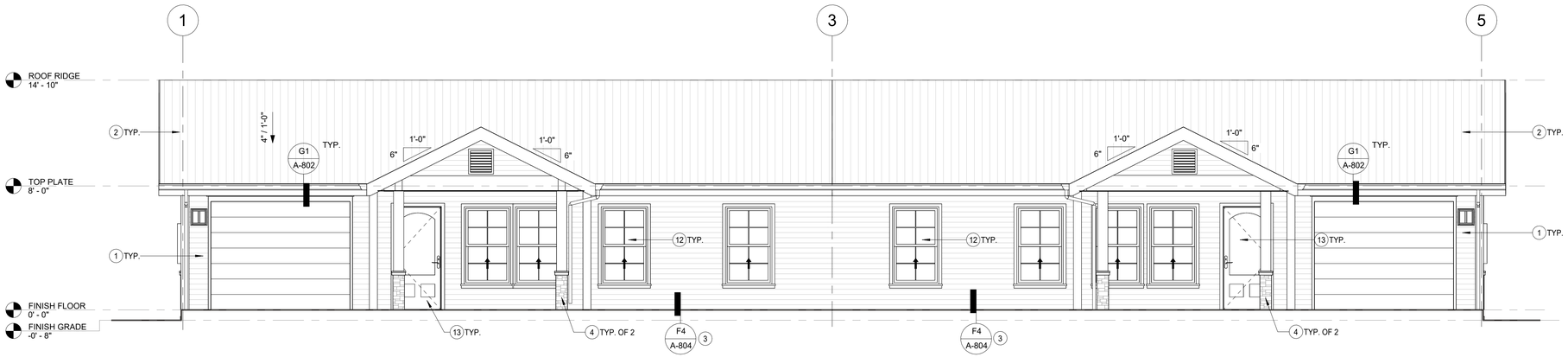
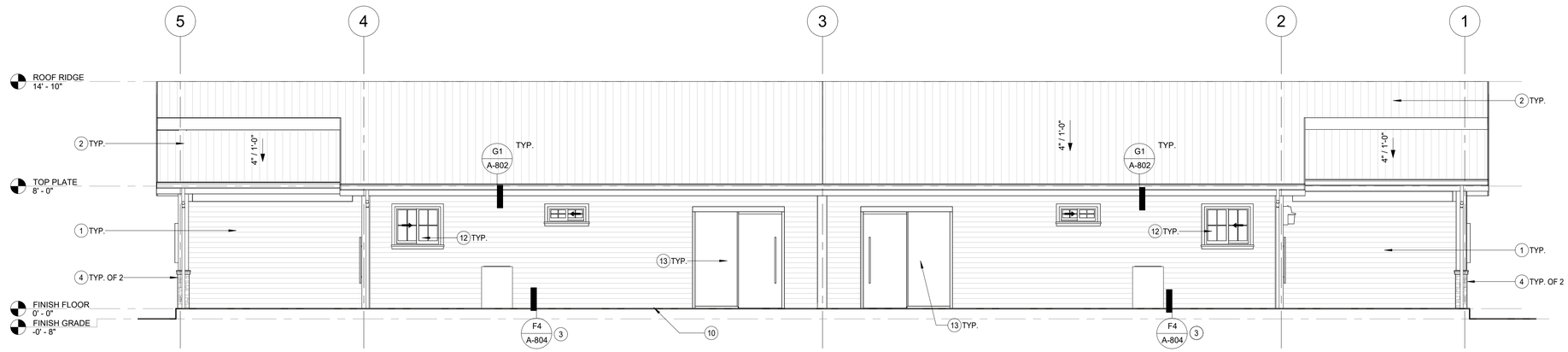
24" X 36"



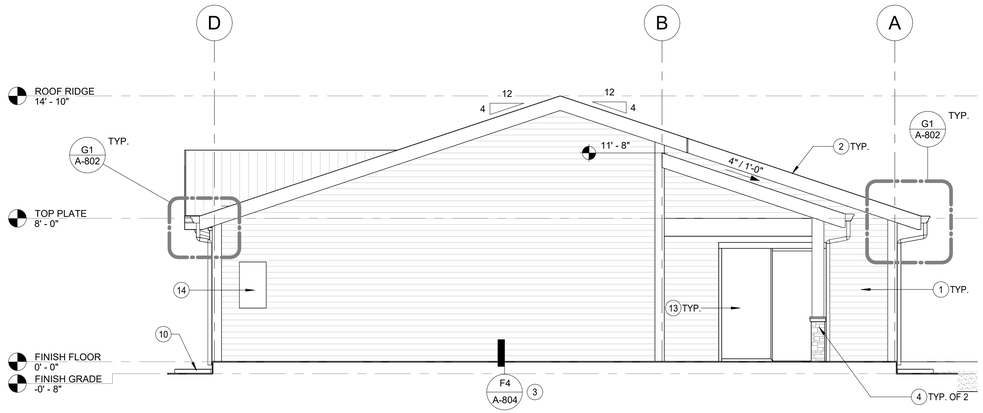
FRONT ELEVATION G2

1/4" = 1'-0"



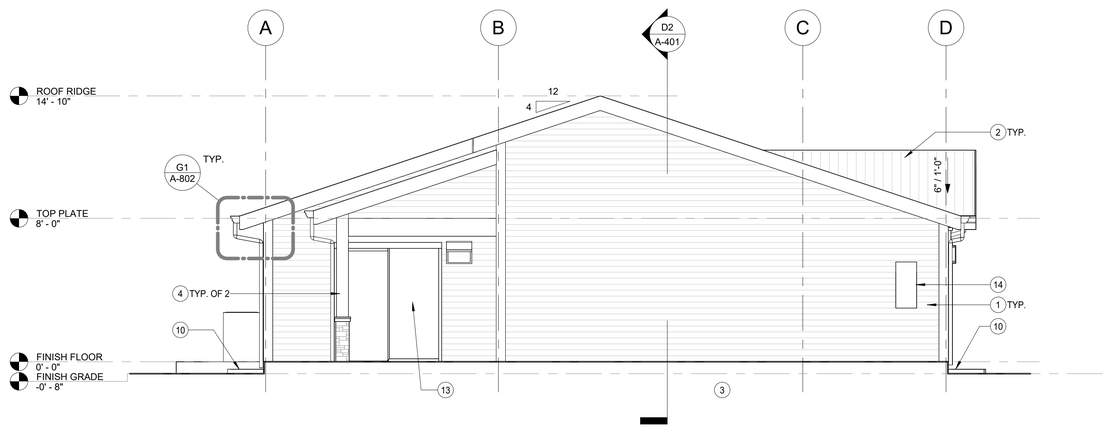
REAR ELEVATION D2

1/4" = 1'-0"



RIGHT SIDE ELEVATION A7

1/4" = 1'-0"



LEFT SIDE ELEVATION A1

1/4" = 1'-0"

ELEVATION / SECTION KEYNOTES

1. "HARDIE PLANK" LAP SIDING OVER 2 LAYER GRADE "D" BUILDING PAPER WITH PERIMETER WEEP SCREED. REFER TO A-804 FOR ADDITIONAL INFORMATION.
   OPTIONAL FINISH: 7/8" STUCCO FINISH OVER 2 LAYERS OF GRADE "D" PAPER INSTALLED OVER PLYWOOD SHEATHING (AS REQUIRED PER STRUCTURAL DRAWING). INSTALL METAL LATH OVER PLYWOOD SHEATHING PER R703.7.1. PROVIDE PERIMETER WEEP SCREED. REFER TO D1 / A-803 FOR ADDITIONAL INFORMATION.
2. 25 YEAR ASPHALT COMPOSITION ROOFING WITH MINIMUM CLASS "C" RATING OVER 30# FELT OVER PLYWOOD SHEATHING. REFER TO A3 / A-202 FOR ADDITIONAL INFORMATION.
   OPTION ROOF: GA. 24 STANDING SEAMLESS METAL ROOF.
3. PERIMETER WEEP SCREED. REFER TO A4 / A-804 , F4 / A-804 , A9 / A-802 FOR ADDITIONAL INFORMATION.
4. TREATED WOOD POST WITH OPTIONAL 2X WRAPPED POST OVER CEMENT PLASTER FINISH AND VENEER STONE. REFER TO STRUCTURAL DRAWINGS AND A6 / A-802 FOR ADDITIONAL INFORMATION.
5. ENGINEERED ROOF TRUSS AND PLYWOOD SHEATHING.
6. CONCRETE PATIO/LANDING. SLOPED AT 2% MAXIMUM AWAY FROM THE BUILDING.
7. **R-21** MINIMUM FIBERGLASS BATTS WALL INSULATION. TYPICAL ON ALL EXTERIOR WALL.
8. **R-38** MINIMUM FIBERGLASS BATT INSULATION. TYPICAL ON ATTIC.
9. **R-13** MINIMUM BATT INSULATION. TYPICAL AT FRAME CAVITY OF ROOF.
10. 11" X 24" CONCRETE BACK SPLASH. PROVIDE ONE PER DOWNSPOUT. POSITION TO DRAIN AWAY FROM THE BUILDING.
11. CONCRETE FOOTING / FOUNDATION. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
12. DUAL GLAZED WINDOW. REFER TO A2 / A-201 FOR ADDITIONAL INFORMATION.
13. DOOR. SEE A2 / A-201 FOR ADDITIONAL INFORMATION.
14. SERVICE PANEL. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
15. ATTIC MOUNTED FURNACE. CLEAR HEADROOM OF NOT LESS THAN 30" SHALL BE PROVIDED IN THE ATTIC SPACE AT OR ABOVE THE ACCESS OPENING. ATTICS CONTAINING APPLIANCES SHALL BE PROVIDED WITH AN OPENING AND A CLEAR AND UNOBSTRUCTED PASSAGEWAY LARGE ENOUGH TO ALLOW REMOVAL OF THE LARGEST APPLIANCE, BUT NOT LESS THAN 30 INCHES HIGH AND 22 INCHES WIDE AND NOT MORE THAN 20 FEET LONG MEASURED ALONG THE CENTERLINE OF THE PASSAGEWAY FROM THE OPENING TO THE APPLIANCE. THE PASSAGEWAY SHALL HAVE CONTINUOUS SOLID FLOORING IN ACCORDANCE SHALL NOT LESS THAN 24 INCHES WIDE. A LEVEL SERVICE SPACE NOT LESS THAN 30 INCHES DEEP AND 30 INCHES WIDE SHALL BE PRESENT ALONG ALL SIDES OF THE APPLIANCE WHERE ACCESS IS REQUIRED. THE CLEAR ACCESS OPENING DIMENSIONS SHALL BE NOT LESS THAN OF 20 INCHES BY 30 INCHES , AND LARGE ENOUGH TO ALLOW REMOVAL OF THE LARGEST APPLIANCE. A PERMANENT 120-VOLT RECEPTACLE OUTLET AND LIGHTING FIXTURE SHALL BE INSTALLED NEAR THE APPLIANCE. THE SWITCH CONTROLLING THE LIGHTING FIXTURE SHALL BE LOCATED AT THE ENTRANCE TO THE PASSAGEWAY. REFER TO D9 / A-803 & G9 / A-803 FOR ADDITIONAL INFORMATION.

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JAN. 02, 2024

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TITLE

ELEVATIONS

SCALE 1/4" = 1'-0"

A-301

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

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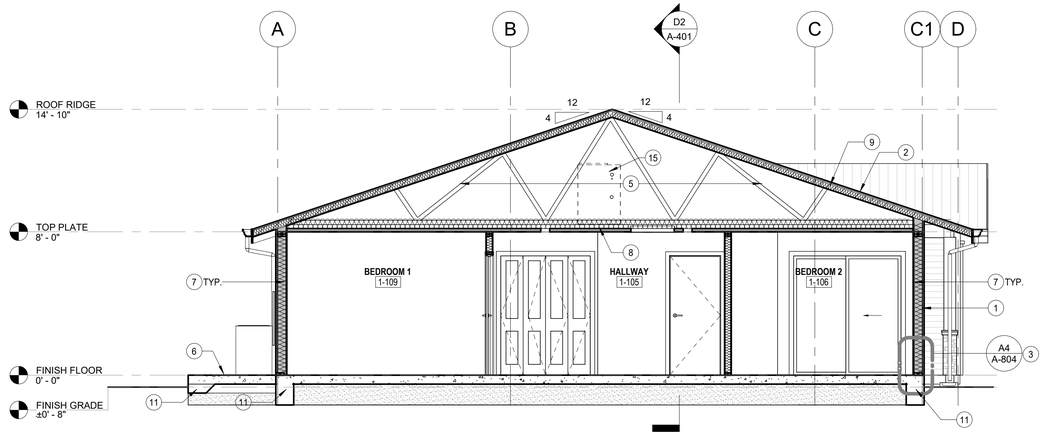
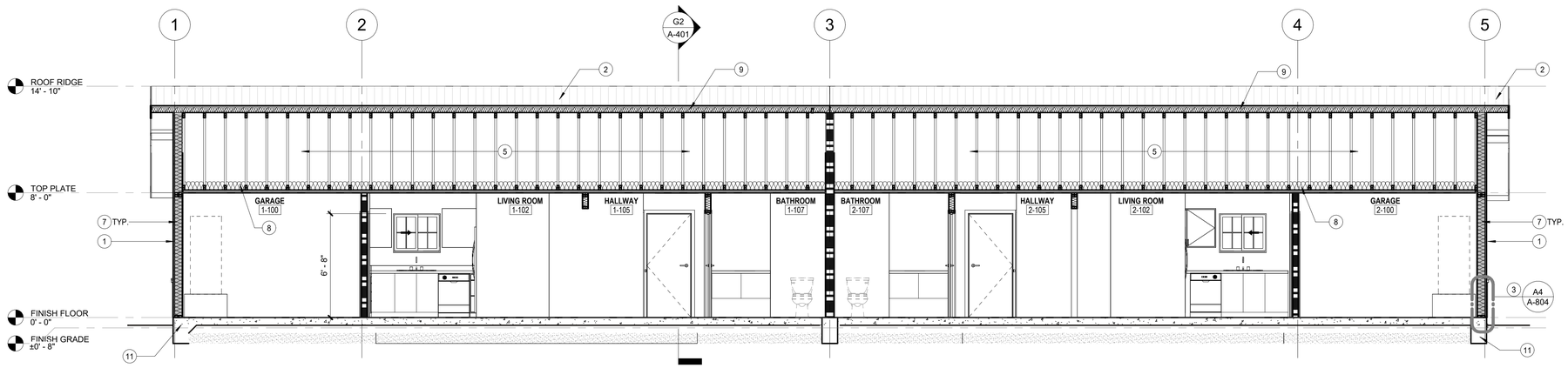
1/2/2024 4:32:29 PM
24" X 36"



CROSS SECTION
1/4" = 1'-0"

G2



LONGITUDINAL SECTION
1/4" = 1'-0"

D2

ELEVATION / SECTION KEYNOTES

1. "HARDIE PLANK" LAP SIDING OVER 2 LAYER GRADE "D" BUILDING PAPER WITH PERIMETER WEEP SCREED. REFER TO A-804 FOR ADDITIONAL INFORMATION.
   OPTIONAL FINISH: 7/8" STUCCO FINISH OVER 2 LAYERS OF GRADE "D" PAPER INSTALLED OVER PLYWOOD SHEATHING (AS REQUIRED PER STRUCTURAL DRAWING). INSTALL METAL LATH OVER PLYWOOD SHEATHING PER R703.7.1. PROVIDE PERIMETER WEEP SCREED. REFER TO D1 / A-803 FOR ADDITIONAL INFORMATION.
2. 25 YEAR ASPHALT COMPOSITION ROOFING WITH MINIMUM CLASS "C" RATING OVER 30# FELT OVER PLYWOOD SHEATHING. REFER TO A3 / A-202 FOR ADDITIONAL INFORMATION.
   OPTION ROOF: GA. 24 STANDING SEAMLESS METAL ROOF.
3. PERIMETER WEEP SCREED. REFER TO A4 / A-804 , F4 / A-804 , A9 / A-802 FOR ADDITIONAL INFORMATION.
4. TREATED WOOD POST WITH OPTIONAL 2X WRAPPED POST OVER CEMENT PLASTER FINISH AND VENEER STONE. REFER TO STRUCTURAL DRAWINGS AND A6 / A-802 FOR ADDITIONAL INFORMATION.
5. ENGINEERED ROOF TRUSS AND PLYWOOD SHEATHING.
6. CONCRETE PATIO/LANDING. SLOPED AT 2% MAXIMUM AWAY FROM THE BUILDING.
7. **R-21** MINIMUM FIBERGLASS BATTS WALL INSULATION. TYPICAL ON ALL EXTERIOR WALL.
8. **R-38** MINIMUM FIBERGLASS BATT INSULATION. TYPICAL ON ATTIC.
9. **R-13** MINIMUM BATT INSULATION. TYPICAL AT FRAME CAVITY OF ROOF.
10. 11" X 24" CONCRETE BACK SPLASH. PROVIDE ONE PER DOWNSPOUT. POSITION TO DRAIN AWAY FROM THE BUILDING.
11. CONCRETE FOOTING / FOUNDATION. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
12. DUAL GLAZED WINDOW. REFER TO A2 / A-201 FOR ADDITIONAL INFORMATION.
13. DOOR. SEE A2 / A-201 FOR ADDITIONAL INFORMATION.
14. SERVICE PANEL. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
15. ATTIC MOUNTED FURNACE. CLEAR HEADROOM OF NOT LESS THAN 30" SHALL BE PROVIDED IN THE ATTIC SPACE AT OR ABOVE THE ACCESS OPENING. ATTICS CONTAINING APPLIANCES SHALL BE PROVIDED WITH AN OPENING AND A CLEAR AND UNOBSTRUCTED PASSAGEWAY LARGE ENOUGH TO ALLOW REMOVAL OF THE LARGEST APPLIANCE, BUT NOT LESS THAN 30 INCHES HIGH AND 22 INCHES WIDE AND NOT MORE THAN 20 FEET LONG MEASURED ALONG THE CENTERLINE OF THE PASSAGEWAY FROM THE OPENING TO THE APPLIANCE. THE PASSAGEWAY SHALL HAVE CONTINUOUS SOLID FLOORING IN ACCORDANCE SHALL NOT LESS THAN 24 INCHES WIDE. A LEVEL SERVICE SPACE NOT LESS THAN 30 INCHES DEEP AND 30 INCHES WIDE SHALL BE PRESENT ALONG ALL SIDES OF THE APPLIANCE WHERE ACCESS IS REQUIRED. THE CLEAR ACCESS OPENING DIMENSIONS SHALL BE NOT LESS THAN OF 20 INCHES BY 30 INCHES , AND LARGE ENOUGH TO ALLOW REMOVAL OF THE LARGEST APPLIANCE. A PERMANENT 120-VOLT RECEPTACLE OUTLET AND LIGHTING FIXTURE SHALL BE INSTALLED NEAR THE APPLIANCE. THE SWITCH CONTROLLING THE LIGHTING FIXTURE SHALL BE LOCATED AT THE ENTRANCE TO THE PASSAGEWAY. REFER TO D9 / A-803 & G9 / A-803 FOR ADDITIONAL INFORMATION.

GENERAL ATTIC FURNACE NOTES:

A. PASSAGEWAY TO THE FURNACE SHALL BE UNOBSTRUCTED AND SHALL HAVE CONTINUOUS SOLID FLOORING NOT LESS THAN 24 INCHES (610MM) WIDE FROM THE ENTRANCE OPENING TO THE FURNACE.

B. A LEVEL WORKING PLATFORM NOT LESS THAN 30 INCHES (762MM) IN DEPTH AND 48 INCHES (1220MM) IN HEIGHT MUST BE PROVIDED IN FRONT OF THE ENTIRE FIREBOX SIDE OF THE FURNACE.

C. A PERMANENT ELECTRIC OUTLET AND LIGHTING FIXTURE SHALL BE PROVIDED AT THE FURNACE AND SHOULD BE CONTROLLED BY A SWITCH LOCATED AT THE REQUIRED ACCESS OPENING.

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PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

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UPDATE

JAN. 02, 2024

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TITLE

BUILDING SECTION

SCALE As indicated

A-401

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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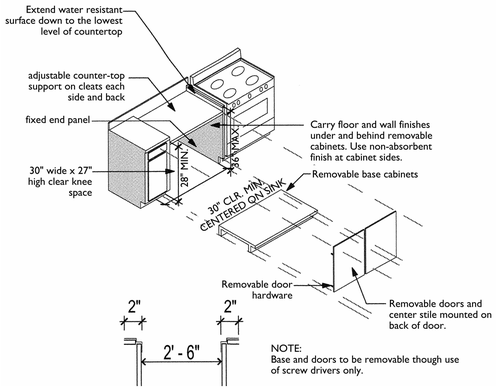
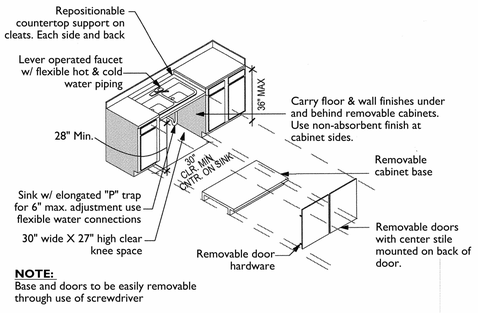
1133A.4.1 REPOSITIONABLE COUNTERTOPS. REPOSITIONABLE COUNTERTOPS SHALL BE PROVIDED IN A MINIMUM OF 5 PERCENT OF THE COVERED MULTIFAMILY DWELLING UNITS. REPOSITIONABLE COUNTERTOPS SHALL COMPLY WITH THE FOLLOWING:

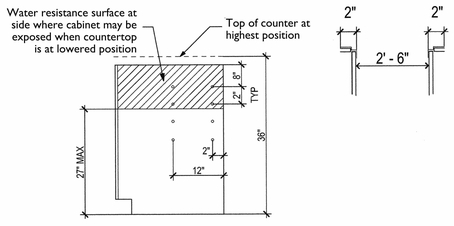
1. SINKS AND WORK SURFACES REQUIRED BY SECTION 1133A.4 SHALL BE DESIGNED TO ENABLE REPOSITIONING TO A MINIMUM HEIGHT OF 28 INCHES.
2. BASE CABINETS DIRECTLY UNDER SINKS AND WORK SURFACES SHALL BE REMOVABLE AS REQUIRED IN SECTION 1133A.3.
3. THE SIDES OF ADJACENT CABINETS AND THE BACK WALL, WHICH MAY BECOME EXPOSED TO MOISTURE OR FOOD HANDLING WHEN A COUNTERTOP IS LOWERED, SHALL BE CONSTRUCTED OF DURABLE, NONABSORBENT MATERIALS APPROPRIATE FOR SUCH USES.
4. FINISHED FLOORING SHALL BE EXTENDED TO THE WALL BENEATH THE SINK AND WORK SURFACE.
   EXCEPTIONS:
   1. STONE, CULTURED STONE AND TILED COUNTERTOPS MAY BE USED WITHOUT MEETING THE REPOSITIONING REQUIREMENTS.
   2. TWO 15-INCH WIDE MINIMUM BREADBOARDS MAY BE PROVIDED IN LIEU OF THE REQUIRED 30 INCHES OF COUNTERTOP WORK SURFACE, AND USED WITHOUT MEETING THE REPOSITIONING REQUIREMENTS.



NOTE:
Base and doors to be removable though use of screw drivers only.



NOTE:
Base and doors to be easily removable through use of screwdriver



1133A.5 LOWER SHELVING. LOWER SHELVING AND/OR DRAWER SPACE SHALL BE PROVIDED IN THE KITCHEN AT A HEIGHT OF NO MORE THAN 48 INCHES ABOVE THE FLOOR.

1133A.6 KITCHEN SINK FAUCET CONTROLS. FAUCET CONTROLS AND OPERATING MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 POUNDS. LEVER-OPERATED,PUSH-TYPE AND ELECTRONICALLY CONTROLLED MECHANISMS ARE EXAMPLES OF ACCEPTABLE DESIGNS. SELF-CLOSING VALVES ARE ALLOWED IF THE FAUCET REMAINS OPEN FOR AT LEAST 10 SECONDS.

1133A.7 KNEE AND TOE SPACE. KNEE AND TOE SPACE, WHEN REQUIRED BY SECTION 1133A, SHALL COMPLY WITH SECTION 1138A.2 AND THE FOLLOWING:

1. THE KNEE AND TOE SPACE SHALL BE CLEAR AND UNOBSTRUCTED, OR REMOVABLE BASE CABINETS IN COMPLIANCE WITH SECTION 1133A.3 SHALL BE PROVIDED.
2. THE KNEE AND TOE SPACE SHALL BE 30 INCHES WIDE MINIMUM, CENTERED ON THE SINK, COUNTERTOP OR APPLIANCE.
3. A CLEAR FLOOR SPACE SHALL NOT EXTEND INTO THE KNEE AND TOE SPACE MORE THAN 19 INCHES.

1133A.7.1 PLUMBING PROTECTION. WATER SUPPLY AND DRAIN PIPES UNDER KITCHEN SINKS SHALL BE INSULATED OR OTHERWISE COVERED TO PROTECT AGAINST CONTACT. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER KITCHEN SINKS.

REPOSITIONABLE COUNTERTOPS A10
12" = 1'-0"

ACCESSIBLE ROUTE WITHIN COVERED (MULTIFAMILY DWELLING UNITS)

1130A.1 GENERAL.
AN ACCESSIBLE ROUTE SHALL BE PROVIDED THROUGH ALL ROOMS AND SPACES OF THE DWELLING UNIT. THE ACCESSIBLE ROUTE SHALL PASS THROUGH THE PRIMARY ENTRY DOOR, AND SHALL CONNECT WITH ALL ADDITIONAL EXTERIOR DOORS, REQUIRED CLEAR FLOOR SPACES AT KITCHEN APPLIANCES AND BATHROOM FIXTURES. FOR THE PURPOSE OF THIS SECTION, "ACCESSIBLE ROUTES" MAY INCLUDE HALLWAYS, CORRIDORS AND RAMPS. EXCEPTION: AN ACCESSIBLE ROUTE IS NOT REQUIRED FROM THE INTERIOR OF THE UNIT INTO A BASEMENT OR GARAGE, EXCEPT AS PROVIDED IN SECTION 1105A.1.
1130A.2 WIDTH.
THE ACCESSIBLE ROUTE INTO AND THROUGHOUT COVERED MULTIFAMILY DWELLING UNITS SHALL BE AT LEAST 36 INCHES WIDE.

SECTION 1131A - CHANGES IN LEVEL ON ACCESSIBLE ROUTES

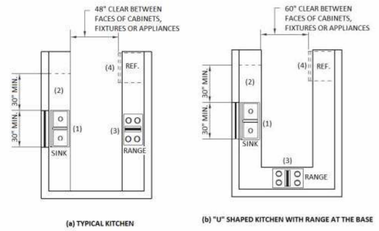
1131A.1 CHANGES IN LEVEL NOT EXCEEDING 1/2 INCH. ABRUPT CHANGES IN LEVEL ALONG ANY ACCESSIBLE ROUTE SHALL NOT EXCEED 1/2 INCH. WHEN CHANGES IN LEVEL DO OCCUR, THEY SHALL BE BEVELED WITH A SLOPE NO GREATER THAN 1 UNIT VERTICAL IN 2 UNITS HORIZONTAL (50-PERCENT SLOPE). CHANGES IN LEVEL NOT EXCEEDING 1/4 INCH MAY BE VERTICAL.
1131A.2 CHANGES GREATER THAN 1/2 INCH. CHANGES IN LEVEL GREATER THAN 1/2 INCH SHALL BE MADE BY MEANS OF A SLOPED SURFACE NOT GREATER THAN 1 UNIT VERTICAL IN 20 UNITS HORIZONTAL (5-PERCENT SLOPE), OR A RAMP, ELEVATOR OR PLATFORM (WHEELCHAIR) LIFT. SEE SECTION 1122A FOR RAMPS AND SECTION 1124A.11 FOR PLATFORM (WHEELCHAIR) LIFTS.

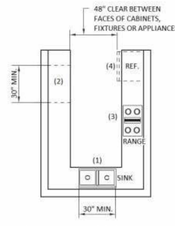
SECTION 1132A - DOORS

1132A.1 PRIMARY ENTRY DOORS AND REQUIRED EXIT DOORS. THE WIDTH AND HEIGHT OF PRIMARY ENTRY DOORS AND ALL REQUIRED EXIT DOORS SHALL COMPLY WITH SECTION 1126A.1. THE REQUIREMENTS OF SECTIONS 1126A.3 SHALL APPLY TO MANEUVERING CLEARANCES AT THE SIDE OF THE DOOR EXPOSED TO COMMON OR PUBLIC USE SPACES (E.G., ENTRY OR EXIT DOORS WHICH OPEN FROM THE COVERED MULTIFAMILY DWELLING UNIT INTO A CORRIDOR, HALLWAY OR LOBBY, OR DIRECTLY TO THE OUTSIDE).

SECTION 1133A - KITCHENS

1133A.1 GENERAL. KITCHENS SHALL BE ON AN ACCESSIBLE ROUTE AND SHALL COMPLY WITH THIS SECTION. (SEE FIGURE 11A-10A.)





(1) 30" MINIMUM COUNTERTOP SPACE FOR SINK INSTALLATION WITH REMOVABLE BASE CABINET AND FINISH FLOORING BENEATH THE SINK.
(2) 3" MINIMUM COUNTERTOP FOR WORK SURFACE WITH REMOVABLE CABINET AND FINISH FLOORING BENEATH.
(3) 30" X 48" MINIMUM CLEAR FLOOR SPACE ADJACENT TO RANGE TO ALLOW PARALLEL APPROACH.
(4) 30" X 48" CLEAR FLOOR SPACE AT REFRIGERATOR, DISHWASHER, TRASH COMPACTOR OR OTHER APPLIANCE TO ALLOW PARALLEL OR FORWARD APPROACH.

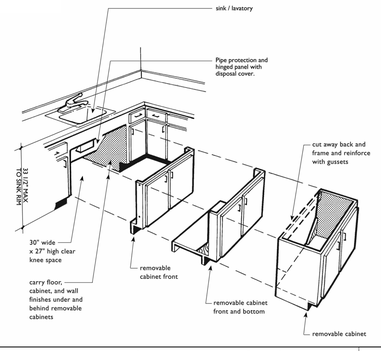
ACCESSIBLE ROUTES D7
12" = 1'-0"

113A.3 REMOVABLE BASE CABINETS. SINKS AND WORK SURFACES REQUIRED BY SECTION 113A.4 (SEE ITEM 1 AND ITEM 2) SHALL BE PROVIDED WITH KNEE AND TOE SPACE COMPLYING WITH SECTION 113A.7. BASE CABINETS (INCLUDING TOE BOARD AND SHELVING) DIRECTLY UNDER KITCHEN SINKS AND WORK SURFACES SHALL BE REMOVABLE WITHOUT THE USE OF SPECIALIZED TOOLS OR SPECIALIZED KNOWLEDGE IN ORDER TO PROVIDE KNEE AND TOE SPACE. THE FINISH FLOOR BENEATH KITCHEN SINKS AND WORK SURFACES SHALL BE EXTENDED TO THE WALL.

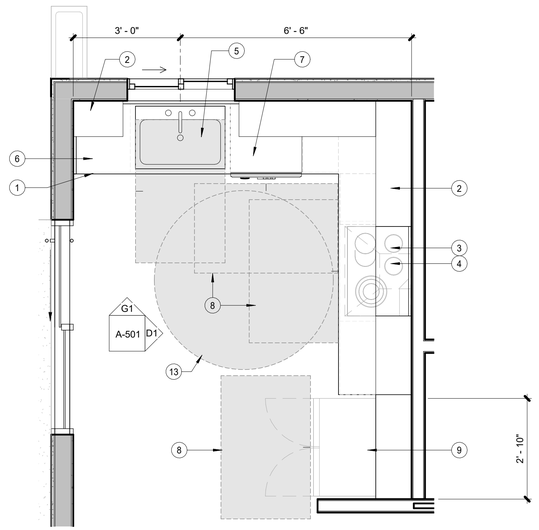
113A.4 COUNTERTOPS. KITCHEN COUNTERTOPS SHALL COMPLY WITH THIS SECTION AND SHALL BE PROVIDED WITH THE FOLLOWING:

1. A MINIMUM LINEAR LENGTH OF 30 INCHES OF COUNTERTOP SHALL BE PROVIDED FOR THE KITCHEN INSTALLATION.
2. A MINIMUM LINEAR LENGTH OF 30 INCHES OF COUNTERTOP SHALL BE PROVIDED FOR A WORK SURFACE.
3. SINKS AND WORK SURFACES MAY BE A SINGLE INTEGRAL UNIT A MINIMUM OF 60 INCHES IN LENGTH, OR BE SEPARATE COMPONENTS.

EXCEPTION. TWO 15-INCH WIDE MINIMUM BREADBOARDS MAY BE PROVIDED IN LIEU OF THE REQUIRED 30 INCHES OF COUNTERTOP WORK SURFACE.



REMOVABLE BASE CABINET A7
12" = 1'-0"



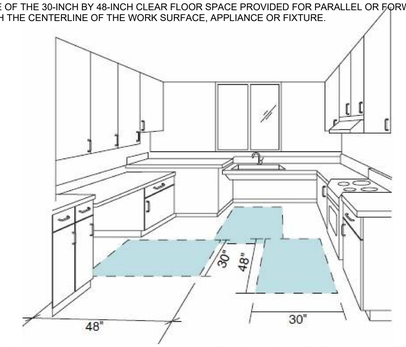
KEYNOTES (#)

1. BUILT-IN CABINETRY WITH SHELVING. PROVIDE 50% OF STORAGE AT 48" MAX. A.F.F. REFER TO A-802 FOR ADDITIONAL INFORMATION.
2. UPPER KITCHEN CABINET WITH ADJUSTABLE SHELVING. REFER TO G6 / A-802 FOR ADDITIONAL INFORMATION.
3. HOOD WITH FAN OVER COOKTOP. PROVIDE 30" VERTICAL AND 6" HORIZONTAL CLEARANCE VENT THROUGH ROOF. PROVIDE GAS AND ELECTRIC LINE.
4. 4 BURNER ELECTRIC COOKTOP. PROVIDE (OPTIONAL GAS) LINE. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
5. PROVIDE A MINIMUM OF 30" WIDE MIN. UNDERCOUNTER CLEAR SPACE OR INSTALL A REMOVABLE UNDERCOUNTER CABINETRY. UNDERCOUNTER SHALL BE REMOVABLE WITHOUT THE USE OF SPECIALIZED TOOL. FINISH FLOOR BENEATH THE COUNTER AREA AND EXTEND TO THE WALL. REFER TO G9 / A-802 / A7 / A-501 FOR ADDITIONAL INFORMATION.
6. 36" MAX. HIGH SOLID SURFACE COUNTER TOP WITH LOWER SHELVING. PROVIDE (2) 15" WIDE PULL-OUT BREADBOARDS. REFER TO A10 / A-501 , D9 / A-802 FOR ADDITIONAL INFORMATION.
7. UNDER-COUNTER DISHWASHER.
8. 30" X 48" CLEAR FLOOR SPACE FOR WHEELCHAIR USER. REFER TO A3 / A-501 FOR ADDITIONAL INFORMATION. REFRIGERATOR SPACE WITH WATER CONNECTION
9. KITCHEN SINK, 8" MAX. DEPTH.
10. GYPSUM BOARD - PAINT.
11. PROVIDE GYPSUM BOARD SOFFIT BETWEEN UPPER CABINET AND CEILING. SOFFIT TO BE CONSTRUCTED BELOW THE FIRE-RESISTANCE-RATED FLOOR/CEILING OR ROOF/CEILING ASSEMBLY WHERE OCCURS.
12. 60" DIAMETER CLEAR TURNING SPACE MEASURED FROM FACE OF APPLIANCE OR COUNTERTOP.
13. 6" SPLASH GUARD. TYP. ON PERIMETER OF KITCHEN COUNTER

ENLARGED ADAPTABLE KITCHEN D3
1/2" = 1'-0"

1133A.2 CLEAR FLOOR SPACE. CLEAR FLOOR SPACE AT KITCHENS SHALL COMPLY WITH THE FOLLOWING:

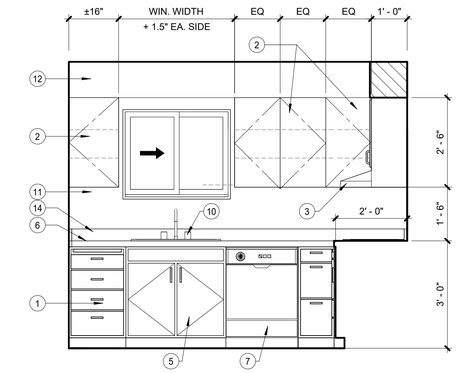
1. A CLEAR FLOOR SPACE AT LEAST 30 INCHES BY 48INCHES THAT ALLOWS A PARALLEL APPROACH BY A PERSON IN A WHEELCHAIR SHALL BE PROVIDED AT THE RANGE OR COOKTOP.
2. A CLEAR FLOOR SPACE AT LEAST 30 INCHES BY 48 INCHES THAT ALLOWS EITHER A PARALLEL OR FORWARD APPROACH SHALL BE PROVIDED AT THE KITCHEN SINK AND ALL OTHER FIXTURES OR APPLIANCES INCLUDING THE OVEN, DISHWASHER, REFRIGERATOR/FREEZER AND TRASH COMPACTOR.
3. A CLEAR FLOOR SPACE AT LEAST 30 INCHES BY 48 INCHES THAT ALLOWS EITHER A PARALLEL OR A FORWARD APPROACH SHALL BE PROVIDED AT THE WORK SURFACE REQUIRED BY SECTION 1133A.4.
4. THE CENTERLINE OF THE 30-INCH BY 48-INCH CLEAR FLOOR SPACE PROVIDED FOR PARALLEL OR FORWARD APPROACH SHALL BE ALIGNED WITH THE CENTERLINE OF THE WORK SURFACE, APPLIANCE OR FIXTURE.



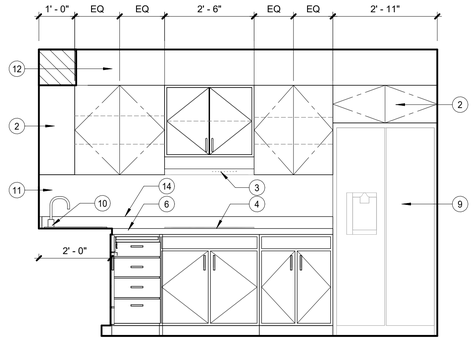
1133A.2.1 CLEAR WIDTH. KITCHENS SHALL HAVE A MINIMUM CLEAR WIDTH MEASURED BETWEEN ANY CABINET, COUNTERTOP OR THE FACE OF ANY APPLIANCE (EXCLUDING HANDLES AND CONTROLS) THAT PROJECTS INTO THE KITCHEN AND THE OPPOSING CABINET, COUNTERTOP,
APPLIANCE OR WALL AS FOLLOWS:

1. U-SHAPED KITCHENS, DESIGNED WITH PARALLEL APPROACH AT A RANGE OR COOKTOP LOCATED AT THE BASE OF THE U, SHALL HAVE A MINIMUM CLEAR WIDTH OF AT LEAST 60 INCHES. (SEE FIGURE 11A-10A.)
2. U-SHAPED KITCHENS, DESIGNED WITH A COOKTOP OR SINK LOCATED AT THE BASE OF THE U, WHICH PROVIDES A KNEE AND TOE SPACE IN ACCORDANCE WITH SECTION 1133A.7 TO ALLOW FOR A FORWARD APPROACH, SHALL HAVE A CLEAR WIDTH OF AT LEAST 48 INCHES. (SEE FIGURE 11A-10A.)
3. ALL OTHER KITCHEN DESIGNS SHALL PROVIDE A MINIMUM CLEAR WIDTH OF AT LEAST 48 INCHES. (SEE FIGURE 11A-10A.)

MIN. CLEAR FLOOR SPACE A3
12" = 1'-0"



ADAPTABLE KITCHEN ELEVATION A G1
1/2" = 1'-0"



ADAPTABLE KITCHEN ELEVATION B D1
1/2" = 1'-0"

GENERAL NOTES:

A. PLUMBING PROTECTION - HOT WATER AND DRAIN PIPES EXPOSED UNDER KITCHEN SINKS SHALL BE INSULATED OR OTHERWISE COVERED. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER SINKS.

B. KITCHEN SINK FAUCET CONTROLS AND OPERATING MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAT 5 POUNDS. LEVER-OPERATED, PUSH TYPE AND ELECTRONICALLY CONTROLLED MECHANISMS ARE EXAMPLES OF ACCEPTABLE DESIGNS. SELF CLOSING VALVES ARE ALLOWED IF THE FAUCET REMAINS OPEN FOR AT LEAST 10 SECONDS. 1133A.6.

C. HORIZONTAL DASHED LINES INDICATE INTERIOR SHELVES

D. ELECTRICAL OUTLET BOXES AND SWITCH BOXES LOCATED ABOVE THE COUNTERTOP SHALL BE AT 45" MAXIMUM AFF. 1138A.3.2.2.

E. ALL GYPSUM BOARD BEHIND SINK AND DISHWASHER TO BE MOLD AND WATER RESISTANT.

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SEAL & SIGNATURE

LICENSED ARCHITECT — ROBIANA R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

ENLARGED ADAPTABLE KITCHEN & DETAILS

SCALE As indicated

A-501

ISSUE DATE	JOB NUMBER
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Author	Checker

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24" X 36"

1134A.7 WATER CLOSETS.
WATER CLOSETS IN BATHROOMS OR POWDER ROOMS REQUIRED TO BE ACCESSIBLE SHALL COMPLY WITH THIS SECTION.

1. **FLOOR SPACE AND LOCATION.** THE MINIMUM FLOOR SPACE PROVIDED AT A WATER CLOSET SHALL BE 48 INCHES IN CLEAR WIDTH. THE CLEAR FLOOR SPACE SHALL EXTEND PAST THE FRONT EDGE OF THE WATER CLOSET AT LEAST 36 INCHES. SEE **FIGURE 11A-9M**.

   EXCEPTION: THE 48-INCH MINIMUM CLEAR WIDTH MAY BE REDUCED TO 36 INCHES FOR LAVATORIES, CABINETS, WING WALLS OR PRIVACY WALLS LOCATED IMMEDIATELY ADJACENT TO A WATER CLOSET WHICH EXTEND NO MORE THAN 24 INCHES IN DEPTH.

   WATER CLOSETS SHALL BE LOCATED WITHIN BATHROOMS IN A MANNER THAT PERMITS A GRAB BAR TO BE INSTALLED ON AT LEAST ONE SIDE OF THE FIXTURE. THE CENTERLINE OF THE WATER CLOSET SHALL BE 17 INCHES MINIMUM TO 18 INCHES MAXIMUM FROM A GRAB BAR WALL OR PARTITION. IN LOCATIONS WHERE WATER CLOSETS ARE ADJACENT TO NON-GRAB BAR WALLS, VANITIES, LAVATORIES OR BATHTUBS, THE CENTERLINE OF THE FIXTURE SHALL BE A MINIMUM OF 18 INCHES FROM THE OBSTACLE.

2. **REINFORCED WALLS FOR GRAB BARS**. WHERE THE WATER CLOSET IS NOT PLACED ADJACENT TO A SIDE WALL CAPABLE OF ACCOMMODATING A GRAB BAR, THE BATHROOM SHALL HAVE PROVISIONS FOR INSTALLATION OF FLOOR-MOUNTED, FOLDAWAY OR SIMILAR ALTERNATIVE GRAB BARS.
   WHERE THE WATER CLOSET IS PLACED ADJACENT TO A SIDE WALL, REINFORCEMENT SHALL BE INSTALLED ON BOTH SIDES OR ONE SIDE AND THE BACK. IF REINFORCEMENT IS INSTALLED AT THE BACK, IT SHALL BE INSTALLED BETWEEN 32 INCHES AND 38 INCHES ABOVE THE FLOOR. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT. THE BACKING SHALL BE A MINIMUM OF 40 INCHES IN LENGTH. REINFORCEMENT INSTALLED AT THE SIDE OF THE WATER CLOSET SHALL BE INSTALLED 32 INCHES TO 38 INCHES ABOVE THE FLOOR. THE REINFORCEMENT SHALL BE INSTALLED A MAXIMUM OF 12 INCHES FROM THE REAR WALL AND SHALL EXTEND A MINIMUM OF 26 INCHES IN FRONT OF THE WATER CLOSET. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT.

3. **SEAT HEIGHT.** THE MINIMUM HEIGHT OF WATER CLOSET SEATS SHALL BE 15 INCHES ABOVE THE FLOOR.

4. **WATER CLOSET CONTROLS.** WATER CLOSET CONTROLS SHALL BE MOUNTED NO MORE THAN 44 INCHES ABOVE THE FLOOR. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 POUNDS.

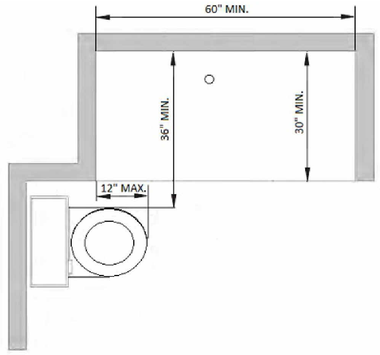


FIGURE 11A-9L
SHOWER WITH WATER CLOSET

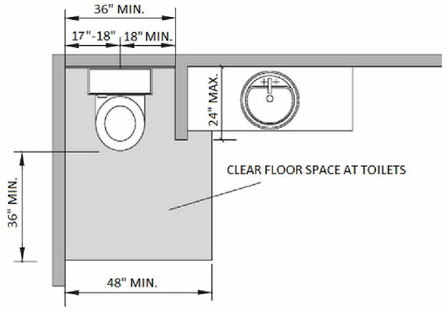
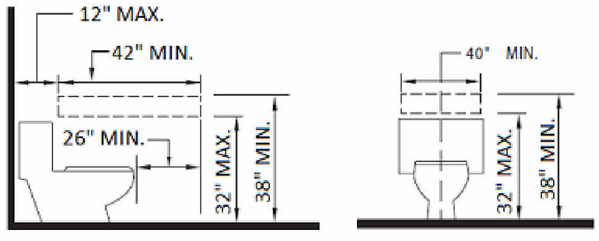


FIGURE 11A-9M
WING WALL OR CABINET AT WATER CLOSET



GRAB BAR REINFORCEMENT FOR ADAPTABLE WATER CLOSETS

REINFORCEMENT FOR ADAPTABLE WATER CLOSET N.T.S. **A9**

SECTION 1134A
BATHING AND TOILET FACILITIES 9
(APPLIES TO COVERED MULTI-FAMILY DWELLING UNITS)

OPTION 2. ONLY ONE BATHROOM WITHIN THE DWELLING UNIT SHALL BE DESIGNED TO COMPLY WITH THE FOLLOWING:

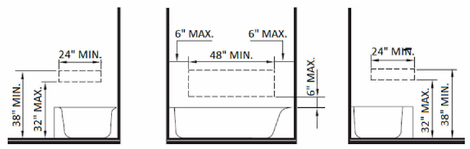
1. TOILET, BATHING AND SHOWER FACILITIES SHALL COMPLY WITH SECTION 1134A.4.
2. BATHTUBS SHALL COMPLY WITH SECTION 1134A.5.
3. SHOWERS SHALL COMPLY WITH SECTION 1134A.6.
4. WATER CLOSETS SHALL COMPLY WITH SECTION 1134A.7.
5. LAVATORIES, VANITIES, MIRRORS AND TOWEL FIXTURES SHALL COMPLY WITH SECTION 1134A.8.
6. WHERE BOTH A TUB AND SHOWER ARE PROVIDED IN THE BATHROOM, AT LEAST ONE SHALL BE MADE ACCESSIBLE. ADDITIONAL REQUIREMENTS APPLY TO DWELLING UNITS CONTAINING TWO OR MORE BATHROOMS WHEN A BATHTUB IS PROVIDED AS THE ACCESSIBLE BATHING FIXTURE.
7. WHERE TWO OR MORE BATHROOMS ARE PROVIDED WITHIN THE SAME DWELLING UNIT AND A BATHTUB IS INSTALLED TO COMPLY WITH OPTION 2, ITEM 6 IN ONE BATHROOM AND A SHOWER STALL IS PROVIDED IN A SUBSEQUENT BATHROOM, BOTH THE BATHTUB SELECTED TO COMPLY WITH OPTION 2, ITEM 6 AND AT LEAST ONE SHOWER STALL WITHIN THE DWELLING UNIT SHALL MEET ALL THE APPLICABLE ACCESSIBILITY REQUIREMENTS PROVIDED IN SECTION 1134A. (SEE SECTION 1134A.5 FOR BATHTUBS, OR SECTION 1134A.6 FOR SHOWERS.)
8. WHEN TWO OR MORE LAVATORIES ARE PROVIDED, AT LEAST ONE SHALL BE MADE ACCESSIBLE AND COMPLY WITH SECTION 1134A.8.
9. BATHROOMS SHALL BE PROVIDED WITH AN ACCESSIBLE ROUTE INTO AND THROUGH THE BATHROOM.
10. IF A DOOR IS PROVIDED, IT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 1132A.5.
11. A MINIMUM 18-INCH CLEAR MANEUVERING SPACE SHALL BE PROVIDED ON THE SWING SIDE OF THE DOOR AT THE STRIKE EDGE OF THE DOOR.
12. SWITCHES, OUTLETS AND CONTROLS SHALL COMPLY WITH SECTION 1142A.
13. REINFORCED WALLS TO ALLOW FOR THE FUTURE INSTALLATION OF GRAB BARS AROUND THE TOILET, TUB AND SHOWER SHALL COMPLY WITH SECTIONS 1134A.5 FOR BATHTUBS, 1134A.6 FOR SHOWERS AND 1134A.7 FOR WATER CLOSETS. GRAB BARS SHALL COMPLY WITH SECTIONS 1127A.4 AND 1127A.2.2, ITEM 4.

WHEN OPTION 2 IS USED, ALL ADDITIONAL BATHROOMS MUST COMPLY WITH ITEMS 8 THROUGH 12 ABOVE

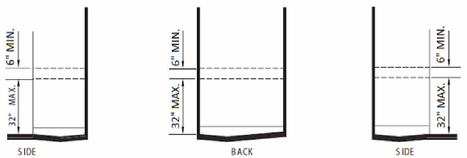
1134A.4 SUFFICIENT MANEUVERING SPACE.
BATHING AND TOILET FACILITIES REQUIRED TO BE ADAPTABLE SHALL PROVIDE SUFFICIENT MANEUVERING SPACE FOR A PERSON USING A WHEELCHAIR OR OTHER MOBILITY AID TO ENTER AND CLOSE THE DOOR, USE THE FIXTURES, REOPEN THE DOOR AND EXIT. WHERE THE DOOR SWINGS INTO THE BATHROOM OR POWDER ROOM, THERE SHALL BE A CLEAR MANEUVERING SPACE OUTSIDE THE SWING OF THE DOOR OF AT LEAST 30 INCHES BY 48 INCHES WITHIN THE ROOM. THE CLEAR MANEUVERING SPACE SHALL ALLOW THE USER TO POSITION A WHEELCHAIR OR OTHER MOBILITY AID CLEAR OF THE PATH OF THE DOOR AS IT IS CLOSED AND TO PERMIT USE OF FIXTURES. DOORS MAY SWING INTO THE REQUIRED CLEAR SPACE AT ANY FIXTURE WHEN A CLEAR MANEUVERING SPACE IS PROVIDED OUTSIDE THE SWING ARC OF THDOOR SO IT CAN BE CLOSED. MANEUVERING SPACES MAY INCLUDE ANY KNEE SPACE OR TOE SPACE AVAILABLE BELOW BATHROOM FIXTURES.

1134A.5 BATHTUBS. BATHTUBS REQUIRED TO BE ACCESSIBLE SHALL COMPLY WITH THIS SECTION.

1. **FLOOR SPACE.** THERE SHALL BE A MINIMUM CLEAR FLOOR SPACE 48 INCHES PARALLEL BY 30 INCHES PERPENDICULAR TO THE SIDE OF A BATHTUB OR BATHTUB- SHOWER COMBINATION TO PROVIDE FOR THE MANEUVERING OF A WHEELCHAIR AND TRANSFER TO AND FROM THE BATHING FACILITIES. THE CONTROLS SHALL BE ON THE WALL AT THE FOOT OF THE BATHTUB. THE EDGE OF THE CLEAR FLOOR SPACE SHALL BE FLUSH WITH THE CONTROL WALL SURFACE. SPACE AREA UNDER A LAVATORY, LOCATED AT THE CONTROL END OF THE TUB, MAY BE INCLUDED IN THE CLEAR FLOOR SPACE PROVIDED THE LAVATORY IS 19 INCHES MAXIMUM DEEP, AND THE KNEE AND TOE SPACE COMPLY WITH **SECTION 1134A.8**. CABINETS UNDER LAVATORIES AND TOILETS SHALL NOT ENCROACH INTO THE CLEAR FLOOR SPACE.
2. **REINFORCED WALLS FOR GRAB BARS.** A BATHTUB INSTALLED WITHOUT SURROUNDING WALLS SHALL PROVIDE REINFORCED AREAS FOR THE INSTALLATION OF FLOOR-MOUNTED GRAB BARS. WHERE A BATHTUB IS INSTALLED WITH SURROUNDING WALLS, GRAB BAR REINFORCEMENT SHALL BE LOCATED ON EACH END OF THE BATHTUB, 32 INCHES TO 38 INCHES ABOVE THE FLOOR, EXTENDING A MINIMUM OF 24 INCHES FROM THE FRONT EDGE OF THE BATHTUB TOWARD THE BACK WALL OF THE BATHTUB. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT. (SEE FIGURE 11A-9G.)
   GRAB BAR REINFORCEMENT SHALL BE INSTALLED ON THE BACK WALL OF THE BATHTUB A MAXIMUM OF 6 INCHES ABOVE THE BATHTUB RIM EXTENDING UPWARD TO AT LEAST 38 INCHES ABOVE THE FLOOR. GRAB BAR BACKING SHALL BE INSTALLED HORIZONTALLY TO PERMIT THE INSTALLATION OF A 48-INCH GRAB BAR WITH EACH END A MAXIMUM OF 6 INCHES FROM THE END WALLS OF THE BATHTUB. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT.
3. **BATHTUB CONTROLS.** FAUCET CONTROLS AND OPERATION MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 POUNDS. LEVER OPERATED, PUSH TYPE AND ELECTRONICALLY CONTROLLED MECHANISMS ARE EXAMPLES OF ACCEPTABLE DESIGNS.
4. **SHOWER UNIT.** A SHOWER SPRAY UNIT IS NOT REQUIRED IN BATHTUBS.
5. **BATHTUB ENCLOSURES.** DOORS AND PANELS OF BATHTUB ENCLOSURES SHALL BE SUBSTANTIALLY CONSTRUCTED FROM APPROVED, SHATTER-RESISTANT MATERIALS. HINGED DOORS SHALL OPEN OUTWARD. GLAZING USED IN DOORS AND PANELS OF BATHTUB ENCLOSURES SHALL BE FULLY TEMPERED, LAMINATED SAFETY GLASS OR APPROVED PLASTIC. WHEN GLASS IS USED, IT SHALL HAVE MINIMUM THICKNESS OF NOT LESS THAN 1/8 INCH WHEN FULLY TEMPERED, OR 1/4 INCH WHEN LAMINATED, AND SHALL PASS THE TEST REQUIREMENTS OF THIS PART, CHAPTER 24, GLASS AND GLAZING. PLASTICS USED IN DOORS AND PANELS OF BATHTUB ENCLOSURES SHALL BE OF A SHATTER-RESISTANT TYPE.



(b) GRAB BAR REINFORCEMENT FOR ADAPTABLE BATHTUBS

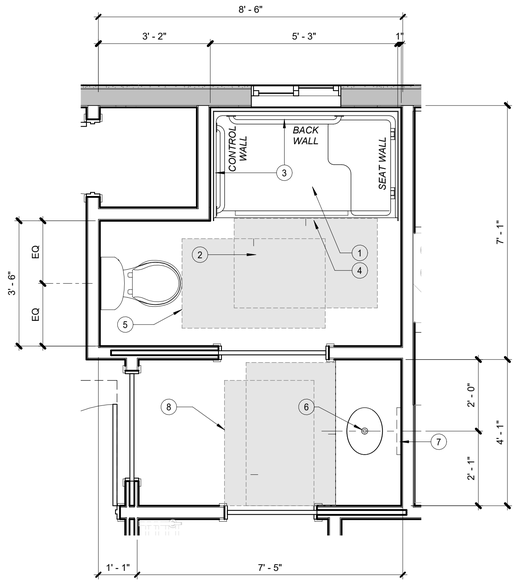


(c) GRAB BAR REINFORCEMENT FOR ADAPTABLE SHOWERS

AREAS OUTLINED IN DASHED LINES REPRESENT LOCATION FOR FUTURE INSTALLATION OF GRAB BARS

FIGURE 11A-9G
REINFORCEMENT FOR GRAB BARS

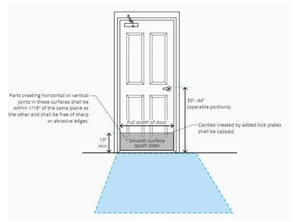
GRAB BAR REINFORCEMENT N.T.S. **A6**



KEYNOTES (#)

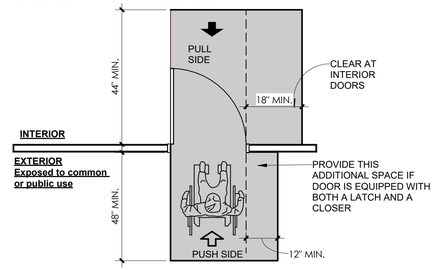
1. ADAPTABLE ROLL-IN SHOWER. MAINTAIN A 2% MAXIMUM SLOPE IN ALL DIRECTIONS. TYPICAL ON ALL SHOWER AND BATHROOMS. REFER TO __A6/A-502__ FOR ADDITIONAL INFORMATION.
2. 30" MIN. X 48" MIN. CLEAR MANEUVERING SPACE. LOCATE OUTSIDE THE SHOWER, FLUSH AND PARALLEL TO THE CONTROL WALL.
3. REINFORCED WALLS FOR GRAB BARS. GRAB BAR REINFORCEMENT SHALL BE INSTALLED CONTINUOUS IN THE WALLS OF SHOWERS 32 INCHES TO 38 INCHES ABOVE THE FLOOR. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT. INSTALLATION OF ACTUAL GRAB BAR IS OPTIONAL). REFER TO __A6/A-502__ FOR ADDITIONAL INFORMATION.
4. SHOWER THRESHOLD SHALL BE A MAXIMUM OF 2 INCHES IN HEIGHT AND HAVE A BEVELED OR SLOPED ANGLE NOT EXCEEDING 1 UNIT VERTICAL IN 2 UNITS HORIZONTAL.
   THRESHOLDS 1/2 INCH OR LESS IN HEIGHT MAY HAVE A BEVELED OR SLOPED ANGLE NOT EXCEEDING 1 UNIT VERTICAL IN 1 UNIT HORIZONTAL.
5. WATER CLOSET. PROVIDE MANEUVERING CLEARANCE. REFER TO __A9/A-502__ FOR ADDITIONAL INFORMATION.
6. LAVATORIES SHALL BE INSTALLED WITH THE CENTERLINE OF THE FIXTURE A MINIMUM OF 18 INCHES HORIZONTALLY FROM AN ADJOINING WALL OR FIXTURE TO ALLOW FOR FORWARD APPROACH. WHEN PARALLEL APPROACH IS PROVIDED, LAVATORIES SHALL BE INSTALLED WITH THE CENTERLINE OF THE FIXTURE A MINIMUM OF 24 INCHES HORIZONTALLY FROM AN ADJOINING WALL OR FIXTURE. THE TOP OF THE FIXTURE RIM SHALL BE A MAXIMUM OF 34 INCHES ABOVE THE FINISHED FLOOR. WATER SUPPLY AND DRAIN PIPES UNDER LAVATORIES SHALL BE INSULATED OR OTHERWISE COVERED TO PROTECT AGAINST CONTACT. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER LAVATORIES. FAUCET CONTROLS AND OPERATION MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST.
7. MIRRORS OR TOWEL FIXTURES SHALL BE MOUNTED WITH THE BOTTOM EDGE NO HIGHER THAN 40 INCHES FROM THE FLOOR.
8. DOOR MANEUVERING CLEARANCE. REFER TO __A1/A-502__ FOR ADDITIONAL INFORMATION.

ENLARGED ADAPTABLE BATHROOM 1/2" = 1'-0" **E1**

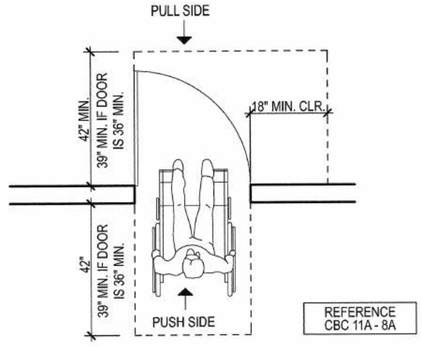


1132A.5.1 GENERAL
THE FLOOR OR LANDING ON THE DWELLING UNIT SIDE OF THE PRIMARY ENTRY DOOR AND ANY REQUIRED EXIT DOOR SHALL HAVE A MINIMUM LENGTH OF NOT LESS THAN 44 INCHES.
SECTION 1126A.3 SHALL APPLY TO MANEUVERING CLEARANCES AT THE SIDE OF THE DOOR EXPOSED TO COMMON OR PUBLIC USE SPACES.
MANEUVERING CLEARANCES AT INTERIOR DOORS SHALL PROVIDE A MINIMUM LENGTH ON BOTH SIDES OF THE DOOR OF AT LEAST 42 INCHES MEASURED AT A RIGHT ANGLE TO THE PLANE OF THE DOOR IN ITS CLOSED POSITION.

EXCEPTION: A 39-INCH LENGTH IS ACCEPTABLE AT INTERIOR DOORS WHEN A MINIMUM CLEAR OPENING WIDTH OF 34 INCHES IS PROVIDED.



PRIMARY DOOR MANEUVERING CLEARANCE 1/4" = 1'-0" **A3**



REFERENCE CBC 11A - 8A

DOOR MANUEVERING - INTERIOR UNITS N.T.S. **A1**

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24" X 36"

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

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STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE **ENLARGED ADAPTABLE BATHROOM & DETAILS**

SCALE As indicated

A-502

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

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SECTION R327 AGING-IN-PLACE DESIGN AND FALL PREVENTION

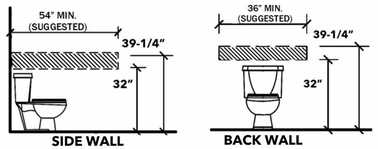
R327.1.1 REINFORCEMENT FOR GRAB BARS

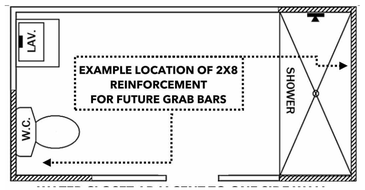
AT LEAST ONE BATHROOM ON THE ENTRY LEVEL SHALL BE PROVIDED WITH REINFORCEMENT INSTALLED IN ACCORDANCE WITH THIS SECTION. WHERE THERE IS NO BATHROOM ON THE ENTRY LEVEL, AT LEAST ONE BATHROOM ON THE SECOND OR THIRD FLOOR OF THE DWELLING SHALL COMPLY WITH THIS SECTION.

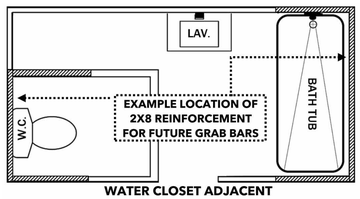
1. REINFORCEMENT SHALL BE SOLID LUMBER OR OTHER CONSTRUCTION MATERIALS APPROVED BY THE ENFORCING AGENCY.
2. REINFORCEMENT SHALL NOT BE LESS THAN 2 BY 8 INCH NOMINAL LUMBER. [11/2 INCH BY 71/4 INCH ACTUAL DIMENSION] OR OTHER CONSTRUCTION MATERIAL PROVIDING EQUAL HEIGHT AND LOAD CAPACITY. REINFORCEMENT SHALL BE LOCATED BETWEEN 32 INCHES AND 39 1/4 INCHES ABOVE THE FINISHED FLOOR FLUSH WITH THE WALL FRAMING.
3. WATER CLOSET REINFORCEMENT SHALL BE INSTALLED ON BOTH SIDE WALLS OF THE FIXTURE, OR ONE SIDE WALL AND THE BACK WALL.
4. SHOWER REINFORCEMENT SHALL BE CONTINUOUS WHERE WALL FRAMING IS PROVIDED.
5. BATHTUB AND COMBINATION BATHTUB/SHOWER REINFORCEMENT SHALL BE CONTINUOUS ON EACH END OF THE BATHTUB AND THE BACK WALL.
6. ADDITIONAL BACK WALL REINFORCEMENT FOR A LOWER GRAB BAR SHALL BE PROVIDED WITH THE BOTTOM EDGE LOCATED NO MORE THAN 6 INCHES ABOVE THE BATHTUB RIM.

EXCEPTIONS:

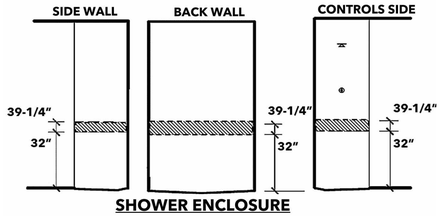
1. WHERE THE WATER CLOSET IS NOT PLACED ADJACENT TO A SIDE WALL CAPABLE OF ACCOMMODATING A GRAB BAR, THE BATHROOM SHALL HAVE PROVISIONS FOR INSTALLATION OF FLOOR-MOUNTED, FOLDAWAY OR SIMILAR ALTERNATE GRAB BAR REINFORCEMENTS APPROVED BY THE ENFORCING AGENCY.
2. REINFORCEMENT SHALL NOT BE REQUIRED IN WALL FRAMING FOR PRE-FABRICATED SHOWER ENCLOSURES AND BATHTUB WALL PANELS WITH INTEGRAL FACTORY- INSTALLED GRAB BARS OR WHEN FACTORY-INSTALLED REINFORCEMENT FOR GRAB BARS IS PROVIDED.
3. SHOWER ENCLOSURES THAT DO NOT PERMIT INSTALLATION OF REINFORCEMENT AND/OR GRAB BARS SHALL BE PERMITTED, PROVIDED REINFORCEMENT FOR INSTALLATION OF FLOOR-MOUNTED GRAB BARS OR AN ALTERNATE METHOD IS APPROVED BY THE ENFORCING AGENCY.
4. BATHTUBS WITH NO SURROUNDING WALLS, OR WHERE WALL PANELS DO NOT PERMIT THE INSTALLATION OF REINFORCEMENT SHALL BE PERMITTED, PROVIDED REINFORCEMENT FOR INSTALLATION OF FLOOR-MOUNTED GRAB BARS ADJACENT TO THE BATHTUB OR AN ALTERNATE METHOD IS APPROVED BY THE ENFORCING AGENCY.
5. REINFORCEMENT OF FLOORS SHALL NOT BE REQUIRED FOR BATHTUBS AND WATER CLOSETS INSTALLED ON CONCRETE SLAB FLOORS.



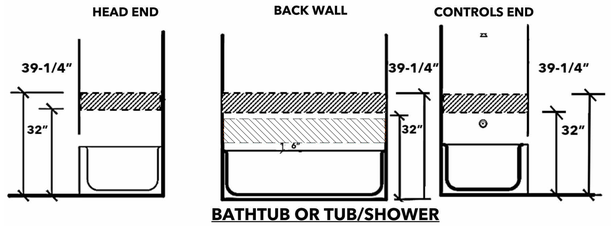




WATER CLOSET ADJACENT TO TWO SIDE WALLS



SHOWER ENCLOSURE



BATHTUB OR TUB/SHOWER

GRAB BAR REINFORCEMENT 12" = 1'-0" A9

SECTION R327 AGING-IN-PLACE DESIGN AND FALL PREVENTION

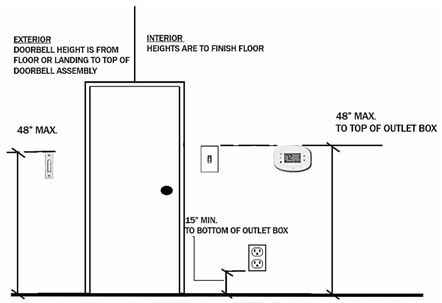
R327.1.2 ELECTRICAL RECEPTACLE OUTLET, SWITCH AND CONTROL HEIGHTS

ELECTRICAL RECEPTACLE OUTLETS, SWITCHES AND CONTROLS (INCLUDING CONTROLS FOR HEATING, VENTILATION AND AIR CONDITIONING) INTENDED TO BE USED BY OCCUPANTS SHALL BE LOCATED NO MORE THAN 48 INCHES MEASURED FROM THE TOP OF THE OUTLET BOX AND NOT LESS THAN 15 INCHES MEASURED FROM THE BOTTOM OF THE OUTLET BOX ABOVE THE FINISH FLOOR.
EXCEPTIONS:

1. DEDICATED RECEPTACLE OUTLETS; FLOOR RECEPTACLE OUTLETS; CONTROLS MOUNTED ON CEILING FANS AND CEILING LIGHTS; AND CONTROLS LOCATED ON APPLIANCES.
2. RECEPTACLE OUTLETS REQUIRED BY THE CALIFORNIA ELECTRICAL CODE ON A WALL SPACE WHERE THE DISTANCE BETWEEN THE FINISHED FLOOR AND A BUILT-IN FEATURE ABOVE THE FINISH FLOOR, SUCH AS A WINDOW, IS LESS THAN 15 INCHES.

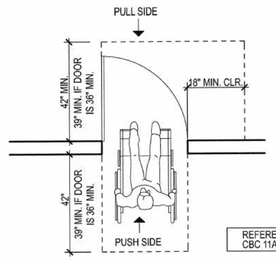
R327.1.3 INTERIOR DOORS
EFFECTIVE JULY 1, 2024, AT LEAST ONE BATHROOM AND ONE BEDROOM ON THE ENTRY LEVEL SHALL PROVIDE A DOORWAY WITH A NET CLEAR OPENING OF NOT LESS THAN 32 INCHES, MEASURED WITH THE DOOR POSITIONED AT AN ANGLE OF 90 DEGREES FROM THE CLOSED POSITION; OR, IN THE CASE OF A TWO OR THREE-STORY SINGLE FAMILY DWELLING, ON THE SECOND OR THIRD FLOOR OF THE DWELLING IF A BATHROOM OR BEDROOM IS NOT LOCATED ON THE ENTRY LEVEL.

R327.1.4 DOORBELL BUTTONS
DOORBELL BUTTONS OR CONTROLS, WHEN INSTALLED, SHALL NOT EXCEED 48 INCHES ABOVE EXTERIOR FLOOR OR LANDING, MEASURED FROM THE TOP OF THE DOORBELL BUTTON ASSEMBLY. WHERE DOORBELL BUTTONS INTEGRATED WITH OTHER FEATURES ARE REQUIRED TO BE INSTALLED ABOVE 48 INCHES MEASURED FROM THE EXTERIOR FLOOR OR LANDING, A STANDARD DOORBELL BUTTON OR CONTROL SHALL ALSO BE PROVIDED AT A HEIGHT NOT EXCEEDING 48 INCHES ABOVE EXTERIOR FLOOR OR LANDING, MEASURED FROM THE TOP OF THE DOORBELL BUTTON OR CONTROL.



HEIGHTS FOR ELECTRICAL RECEPTACLE OUTLETS, SWITCHES, DOORBELL BUTTONS, INCLUDING HVAC CONTROLS

OUTLETS, DOORS & CONTROLS 12" = 1'-0" F6

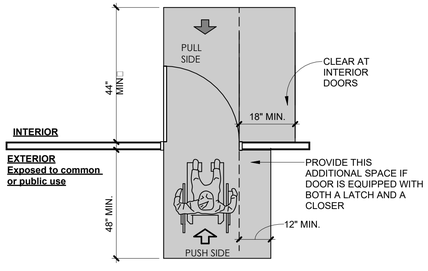


ADAPTABLE FEATURES (OPTIONAL)

DOOR MANUEVERING - INTERIOR UNITS 12" = 1'-0" D6

1132A.5.1 GENERAL
THE FLOOR OR LANDING ON THE DWELLING UNIT SIDE OF THE PRIMARY ENTRY DOOR AND ANY REQUIRED EXIT DOOR SHALL HAVE A MINIMUM LENGTH OF NOT LESS THAN 44 INCHES.
SECTION 1126A.3 SHALL APPLY TO MANEUVERING CLEARANCES AT THE SIDE OF THE DOOR EXPOSED TO COMMON OR PUBLIC USE SPACES.
MANEUVERING CLEARANCES AT INTERIOR DOORS SHALL PROVIDE A MINIMUM LENGTH ON BOTH SIDES OF THE DOOR OF AT LEAST 42 INCHES MEASURED AT A RIGHT ANGLE TO THE PLANE OF THE DOOR IN ITS CLOSED POSITION.

EXCEPTION: A 39-INCH LENGTH IS ACCEPTABLE AT INTERIOR DOORS WHEN A MINIMUM CLEAR OPENING WIDTH OF 34 INCHES IS PROVIDED.



ADAPTABLE FEATURES (OPTIONAL)

PRIMARY DOOR MANEUVERING CLEARANCE 1/4" = 1'-0" A6

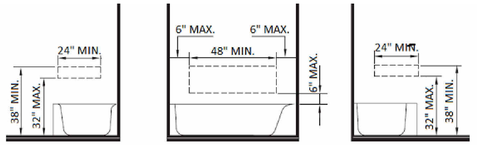
SECTION 1134A BATHING AND TOILET FACILITIES (ADAPTABLE)

OPTION 2. ONLY ONE BATHROOM WITHIN THE DWELLING UNIT SHALL BE DESIGNED TO COMPLY WITH THE FOLLOWING.

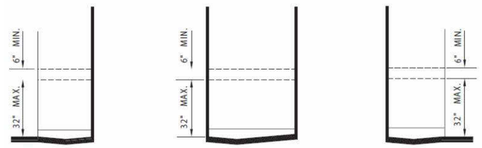
1. TOILET, BATHING AND SHOWER FACILITIES SHALL COMPLY WITH SECTION 1134A.4.
2. BATHTUBS SHALL COMPLY WITH SECTION 1134A.5.
3. SHOWERS SHALL COMPLY WITH SECTION 1134A.6.
4. WATER CLOSETS SHALL COMPLY WITH SECTION 1134A.7.
5. LAVATORIES, VANITIES, MIRRORS AND TOWEL FIXTURES SHALL COMPLY WITH SECTION 1134A.8.
6. WHERE BOTH A TUB AND SHOWER ARE PROVIDED IN THE BATHROOM, AT LEAST ONE SHALL BE MADE ACCESSIBLE. ADDITIONAL REQUIREMENTS APPLY TO DWELLING UNITS CONTAINING TWO OR MORE BATHROOMS WHEN A BATHTUB IS PROVIDED AS THE ACCESSIBLE BATHING FIXTURE.
7. WHERE TWO OR MORE BATHROOMS ARE PROVIDED WITHIN THE SAME DWELLING UNIT AND A BATHTUB IS INSTALLED TO COMPLY WITH OPTION 2, ITEM 6 IN ONE BATHROOM AND A SHOWER STALL IS PROVIDED IN A SUBSEQUENT BATHROOM, BOTH THE BATHTUB SELECTED TO COMPLY WITH OPTION 2, ITEM 6 AND AT LEAST ONE SHOWER STALL WITHIN THE DWELLING UNIT SHALL MEET ALL THE APPLICABLE ACCESSIBILITY REQUIREMENTS PROVIDED IN SECTION 1134A. (SEE SECTION 1134A.5 FOR BATHTUBS, OR SECTION 1134A.6 FOR SHOWERS.)
8. WHEN TWO OR MORE LAVATORIES ARE PROVIDED, AT LEAST ONE SHALL BE MADE ACCESSIBLE AND COMPLY WITH SECTION 1134A.8.
9. BATHROOMS SHALL BE PROVIDED WITH AN ACCESSIBLE ROUTE INTO AND THROUGH THE BATHROOM.
10. IF A DOOR IS PROVIDED, IT SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 1132A.5.
11. A MINIMUM 18-INCH CLEAR MANEUVERING SPACE SHALL BE PROVIDED ON THE SWING SIDE OF THE DOOR AT THE STRIKE EDGE OF THE DOOR.
12. SWITCHES, OUTLETS AND CONTROLS SHALL COMPLY WITH SECTION 1142A.
13. REINFORCED WALLS TO ALLOW FOR THE FUTURE INSTALLATION OF GRAB BARS AROUND THE TOILET, TUB AND SHOWER SHALL COMPLY WITH SECTIONS 1134A.5 FOR BATHTUBS, 1134A.6 FOR SHOWERS AND 1134A.7 FOR WATER CLOSETS. GRAB BARS SHALL COMPLY WITH SECTIONS 1127A.4 AND 1127A.2.2, ITEM 4.

WHEN OPTION 2 IS USED, ALL ADDITIONAL BATHROOMS MUST COMPLY WITH ITEMS 8 THROUGH 12 ABOVE

1134A.4 SUFFICIENT MANEUVERING SPACE.
BATHING AND TOILET FACILITIES REQUIRED TO BE ADAPTABLE SHALL PROVIDE SUFFICIENT MANEUVERING SPACE FOR A PERSON USING A WHEELCHAIR OR OTHER MOBILITY AID TO ENTER AND CLOSE THE DOOR, USE THE FIXTURES, REOPEN THE DOOR AND EXIT. WHERE THE DOOR SWINGS INTO THE BATHROOM OR POWDER ROOM, THERE SHALL BE A CLEAR MANEUVERING SPACE OUTSIDE THE SWING OF THE DOOR OF AT LEAST 30 INCHES BY 48 INCHES WITHIN THE ROOM. THE CLEAR MANEUVERING SPACE SHALL ALLOW THE USER TO POSITION A WHEELCHAIR OR OTHER MOBILITY AID CLEAR OF THE PATH OF THE DOOR AS IT IS CLOSED AND TO PERMIT USE OF FIXTURES. DOORS MAY SWING INTO THE REQUIRED CLEAR SPACE AT ANY FIXTURE WHEN A CLEAR MANEUVERING SPACE IS PROVIDED OUTSIDE THE SWING ARC OF THDOOR SO IT CAN BE CLOSED. MANEUVERING SPACES MAY INCLUDE ANY KNEE SPACE OR TOE SPACE AVAILABLE BELOW BATHROOM FIXTURES.



GRAB BAR REINFORCEMENT FOR ADAPTABLE BATHTUBS
AREAS OUTLINED IN DASHED LINES REPRESENT LOCATION FOR FUTURE INSTALLATION OF GRAB BARS



NOTE: THE AREA OUTLINED IN DASHED LINES REPRESENT LOCATION FOR FUTURE INSTALLATION OF GRAB BARS

Location of grab bar reinforcement for adaptable showers

1134A.5 BATHTUBS. BATHTUBS REQUIRED TO BE ACCESSIBLE SHALL COMPLY WITH THIS SECTION.

1. **FLOOR SPACE.** THERE SHALL BE A MINIMUM CLEAR FLOOR SPACE 48 INCHES PARALLEL BY 30 INCHES PERPENDICULAR TO THE SIDE OF A BATHTUB OR BATHTUB- SHOWER COMBINATION TO PROVIDE FOR THE MANEUVERING OF A WHEELCHAIR AND TRANSFER TO AND FROM THE BATHING FACILITIES. THE CONTROLS SHALL BE ON THE WALL AT THE FOOT OF THE BATHTUB. THE EDGE OF THE CLEAR FLOOR SPACE SHALL BE FLUSH WITH THE CONTROL WALL SURFACE. THE AREA UNDER A LAVATORY, LOCATED AT THE CONTROL END OF THE TUB, MAY BE INCLUDED IN THE CLEAR FLOOR SPACE PROVIDED THE LAVATORY IS 19 INCHES MAXIMUM DEEP, AND THE KNEE AND TOE SPACE COMPLY WITH **SECTION 1134A.8** CABINETS UNDER LAVATORIES AND TOILETS SHALL NOT ENCROACH INTO THE CLEAR FLOOR SPACE.
2. **REINFORCED WALLS FOR GRAB BARS.** A BATHTUB INSTALLED WITHOUT SURROUNDING WALLS SHALL PROVIDE REINFORCED AREAS FOR THE INSTALLATION OF FLOOR-MOUNTED GRAB BARS. WHERE A BATHTUB IS INSTALLED WITH SURROUNDING WALLS, GRAB BAR REINFORCEMENT SHALL BE LOCATED ON EACH END OF THE BATHTUB, 32 INCHES TO 38 INCHES ABOVE THE FLOOR, EXTENDING A MINIMUM OF 24 INCHES FROM THE FRONT EDGE OF THE BATHTUB TOWARD THE BACK WALL OF THE BATHTUB. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT. (SEE FIGURE 11A-9G.)
GRAB BAR REINFORCEMENT SHALL BE INSTALLED ON THE BACK WALL OF THE BATHTUB A MAXIMUM OF 6 INCHES ABOVE THE BATHTUB RIM EXTENDING UPWARD TO AT LEAST 38 INCHES ABOVE THE FLOOR. GRAB BAR BACKING SHALL BE INSTALLED HORIZONTALLY TO PERMIT THE INSTALLATION OF A 48-INCH GRAB BAR WITH EACH END A MAXIMUM OF 6 INCHES FROM THE END WALLS OF THE BATHTUB. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT.
3. **BATHTUB CONTROLS.** FAUCET CONTROLS AND OPERATION MECHANISMS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 POUNDS. LEVER OPERATED, PUSH TYPE AND ELECTRONICALLY CONTROLLED MECHANISMS ARE EXAMPLES OF ACCEPTABLE DESIGNS.
4. **SHOWER UNIT.** A SHOWER SPRAY UNIT IS NOT REQUIRED IN BATHTUBS.
5. **BATHTUB ENCLOSURES.** DOORS AND PANELS OF BATHTUB ENCLOSURES SHALL BE SUBSTANTIALLY CONSTRUCTED FROM APPROVED, SHATTER-RESISTANT MATERIALS. HINGED DOORS SHALL OPEN OUTWARD. GLAZING USED IN DOORS AND PANELS OF BATHTUB ENCLOSURES SHALL BE FULLY TEMPERED, LAMINATED SAFETY GLASS OR APPROVED PLASTIC. WHEN GLASS IS USED, IT SHALL HAVE MINIMUM THICKNESS OF NOT LESS THAN 1/8 INCH WHEN FULLY TEMPERED, OR 1/4 INCH WHEN LAMINATED, AND SHALL PASS THE TEST REQUIREMENTS OF THIS PART, CHAPTER 24, GLASS AND GLAZING. PLASTICS USED IN DOORS AND PANELS OF BATHTUB ENCLOSURES SHALL BE OF A SHATTER-RESISTANT TYPE.

ADAPTABLE FEATURES (OPTIONAL)

GRAB BAR REINFORCEMENT 12" = 1'-0" F1

1134A.7 WATER CLOSETS.
WATER CLOSETS IN BATHROOMS OR POWDER ROOMS REQUIRED TO BE ACCESSIBLE SHALL COMPLY WITH THIS SECTION.

1. **FLOOR SPACE AND LOCATION.** THE MINIMUM FLOOR SPACE PROVIDED AT A WATER CLOSET SHALL BE 48 INCHES IN CLEAR WIDTH. THE CLEAR FLOOR SPACE SHALL EXTEND PAST THE FRONT EDGE OF THE WATER CLOSET AT LEAST 36 INCHES. SEE **FIGURE 11A-9M**.
EXCEPTION: THE 48-INCH MINIMUM CLEAR WIDTH MAY BE REDUCED TO 36 INCHES FOR LAVATORIES, CABINETS, WING WALLS OR PRIVACY WALLS LOCATED IMMEDIATELY ADJACENT TO A WATER CLOSET WHICH EXTEND NO MORE THAN 24 INCHES IN DEPTH.

WATER CLOSETS SHALL BE LOCATED WITHIN BATHROOMS IN A MANNER THAT PERMITS A GRAB BAR TO BE INSTALLED ON AT LEAST ONE SIDE OF THE FIXTURE. THE CENTERLINE OF THE WATER CLOSET SHALL BE 17 INCHES MINIMUM TO 18 INCHES MAXIMUM FROM A GRAB BAR WALL OR PARTITION. IN LOCATIONS WHERE WATER CLOSETS ARE ADJACENT TO NON-GRAB BAR WALLS, VANITIES, LAVATORIES OR BATHTUBS, THE CENTERLINE OF THE FIXTURE SHALL BE A MINIMUM OF 18 INCHES FROM THE OBSTACLE.

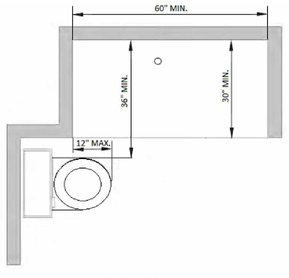


FIGURE 11A-9L
SHOWER WITH WATER CLOSET

2. **REINFORCED WALLS FOR GRAB BARS**. WHERE THE WATER CLOSET IS NOT PLACED ADJACENT TO A SIDE WALL CAPABLE OF ACCOMMODATING A GRAB BAR, THE BATHROOM SHALL HAVE PROVISIONS FOR INSTALLATION OF FLOOR-MOUNTED, FOLDAWAY OR SIMILAR ALTERNATIVE GRAB BARS.
WHERE THE WATER CLOSET IS PLACED ADJACENT TO A SIDE WALL, REINFORCEMENT SHALL BE INSTALLED ON BOTH SIDES OR ONE SIDE AND THE BACK. IF REINFORCEMENT IS INSTALLED AT THE BACK, IT SHALL BE INSTALLED BETWEEN 32 INCHES AND 38 INCHES ABOVE THE FLOOR. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT. THE BACKING SHALL BE A MINIMUM OF 40 INCHES IN LENGTH. REINFORCEMENT INSTALLED AT THE SIDE OF THE WATER CLOSET SHALL BE INSTALLED 32 INCHES TO 38 INCHES ABOVE THE FLOOR. THE REINFORCEMENT SHALL BE INSTALLED A MAXIMUM OF 12 INCHES FROM THE REAR WALL AND SHALL EXTEND A MINIMUM OF 26 INCHES IN FRONT OF THE WATER CLOSET. THE GRAB BAR REINFORCEMENT SHALL BE A MINIMUM OF 6 INCHES NOMINAL IN HEIGHT.

3. **SEAT HEIGHT.** THE MINIMUM HEIGHT OF WATER CLOSET SEATS SHALL BE 15 INCHES ABOVE THE FLOOR.

4. **WATER CLOSET CONTROLS.** WATER CLOSET CONTROLS SHALL BE MOUNTED NO MORE THAN 44 INCHES ABOVE THE FLOOR. THE FORCE REQUIRED TO ACTIVATE CONTROLS SHALL BE NO GREATER THAN 5 POUNDS.

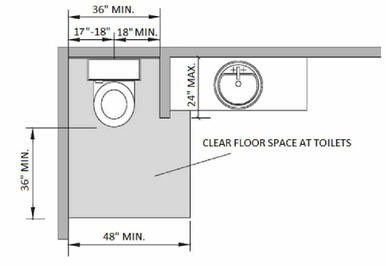
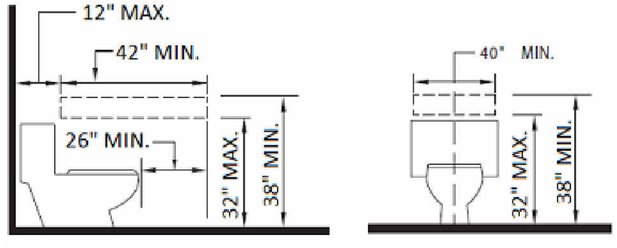


FIGURE 11A-9M
WING WALL OR CABINET AT WATER CLOSET



GRAB BAR REINFORCEMENT FOR ADAPTABLE WATER CLOSETS

ADAPTABLE FEATURES (OPTIONAL)

GRAB BAR REINFORCEMENT (AGING-IN PLACE) 12" = 1'-0" A1

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SEAL & SIGNATURE

LICENSED ARCHITECT
ROBIN R. WRIGHT
NO. C-32283
RENEWAL DATE 06/30/2025
STATE OF CALIFORNIA

UPDATE

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TITLE

AGING-IN PLACE DESIGN

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A-503

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Author	Checker

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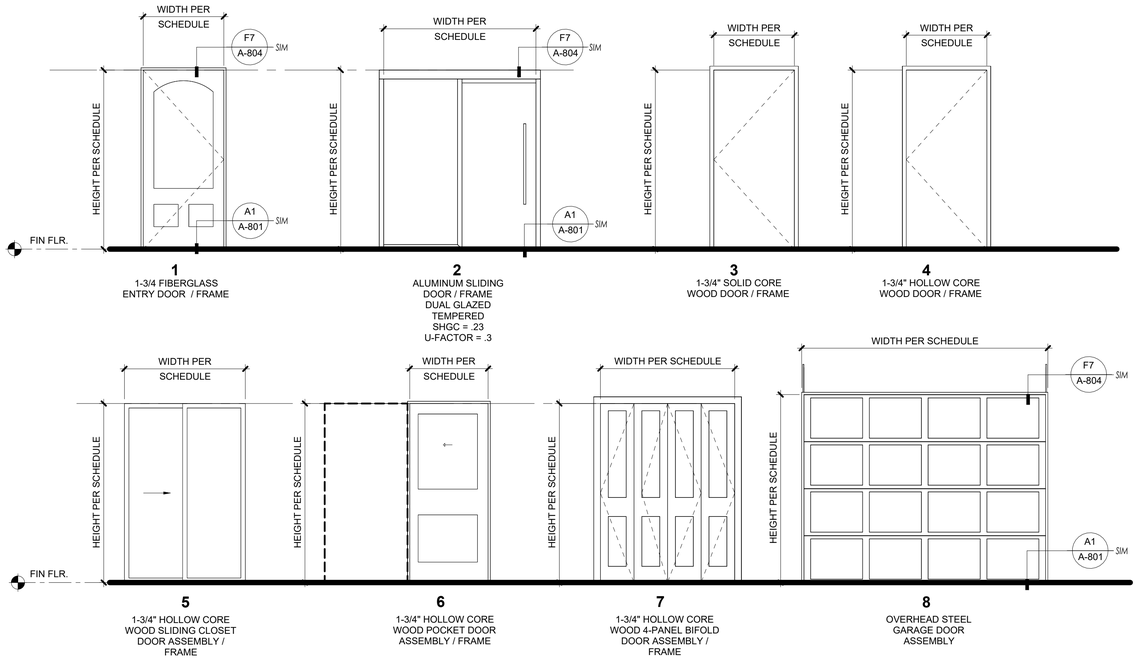
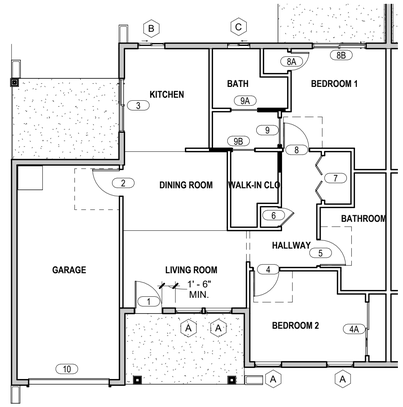
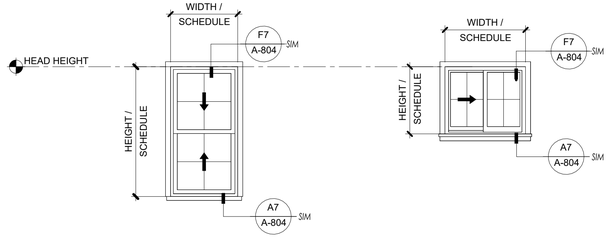
24" X 36"



DOOR LEGEND
3/8" = 1'-0"



DOOR SCHEDULE					
TAG #	ROOM	TYPE	WIDTH	HEIGHT	COMMENTS
1	LIVING ROOM	1	3' - 0"	6' - 8"	
2	GARAGE	3	3' - 0"	6' - 8"	SELF CLOSING & SELF-LATCHING
3	KITCHEN	2	6' - 0"	6' - 8"	TEMPERED / DUAL PANE
4	BEDROOM 2	4	2' - 10"	6' - 8"	
4A	BEDROOM 2	5	6' - 0"	6' - 8"	
5	BATHROOM	4	2' - 10"	6' - 8"	
6	HALLWAY	4	2' - 0"	6' - 8"	
7	W/D	7	5' - 0"	6' - 8"	
8	HALLWAY	4	2' - 10"	6' - 8"	
8A	BEDROOM 1	4	2' - 0"	6' - 8"	
8B	BEDROOM 1	2	6' - 0"	6' - 8"	TEMPERED / DUAL PANE
9	BEDROOM 1	6	3' - 0"	6' - 8"	
9A	BATH	6	3' - 0"	6' - 8"	
9B	WALK-IN CLO.	6	2' - 6"	6' - 8"	
10	GARAGE	8	9' - 0"	7' - 0"	



NOTE:
1. PROVIDE WINDOW FLASHING. TYPICAL ON ALL. REFER TO G1 / A-801 FOR ADDITIONAL INFORMATION.
2. REFER TO F10 / S-102 FOR WINDOW SILL TRIM OVER CEMENT PLASTER WALL FINISH OPTIONS.

WINDOW LEGEND
3/8" = 1'-0"

WINDOW SCHEDULE							
TYPE MARK	WIDTH	HEIGHT	HEAD HEIGHT	SILL HEIGHT	SHGC	U-FACTOR	Comments
A	3' - 0"	5' - 0"	6' - 8"	1' - 8"	0.23	0.3	
B	3' - 0"	2' - 6"	6' - 8"	4' - 2"	0.23	0.3	
C	2' - 6"	1' - 0"	6' - 8"	5' - 8"	0.23	0.3	

KEYPLAN - OPENING SCHEDULE
1/8" = 1'-0"

C1

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LICENSED ARCHITECT — ROBINA R. WRIGHT — NO. C-32283 — RENEWAL DATE 08/30/2025 — STATE OF CALIFORNIA

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TITLE

OPENING SCHEDULES

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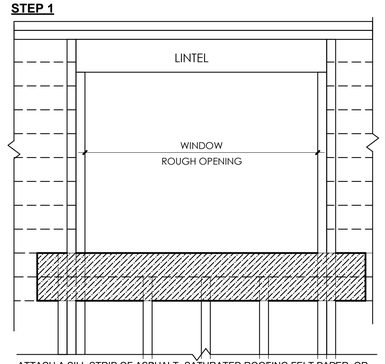
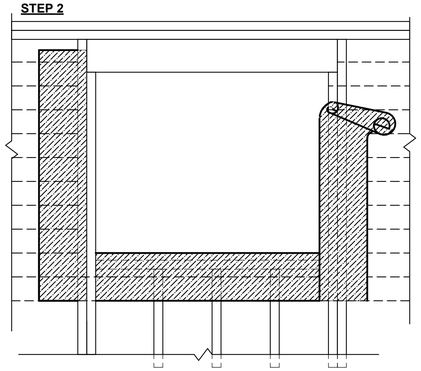
24" X 36"

STEP 1



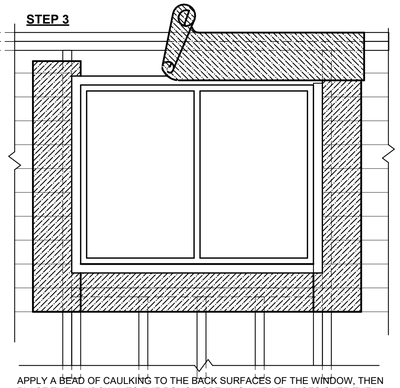
ATTACH A SILL STRIP OF ASPHALT- SATURATED ROOFING FELT PAPER, OR APPROVED FLASHING MATERIAL AT LEAST 8" WIDE WITH THE TOP EDGE EVEN WITH THE TOP EDGE OF THE ROUGH SILL. EXTEND THIS SILL STRIP AT LEAST 8" BEYOND THE EDGE OF THE ROUGH OPENING OF THE WINDOW.

STEP 2



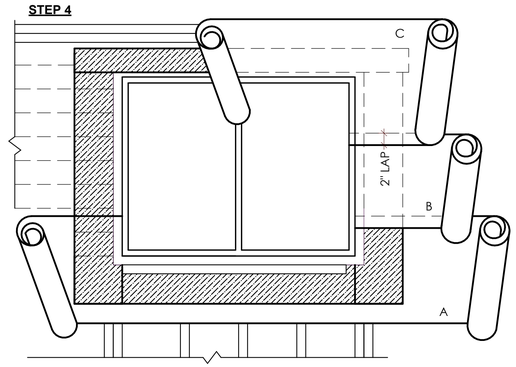
AFTER SILL STRIP IS IN PLACE, ATTACH JAMB STRIP (SIDE OF OPENING) AT LEAST 8" WIDE WITH INSIDE EDGE EVEN WITH EDGE OF WINDOW OPENING. EXTEND JAMB STRIP 4" ABOVE THE TOP OF WINDOW OPENING.

STEP 3



APPLY A BEAD OF CAULKING TO THE BACK SURFACES OF THE WINDOW, THEN PLACE THE WINDOW INTO THE ROUGH OPENING, WITH FLANGES OVER THE INSTALLED FLASHING FELT STRIP. AFTER WINDOW IS PLACED, INSTALL THE HEAD FLASHING OVER THE WINDOW FLANGE. THIS IS ANOTHER STRIP OF FELT AT LEAST 4" WIDE.

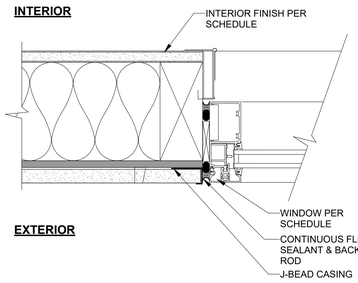
STEP 4



STARTING AT THE BOTTOM OF THE WALL (SOLE PLATE), LAY WATER RESISTANT PAPER UNDER THE SILL STRIP AND CUT TO FIT (A) INSTALL SUCCEEDING COURSES OF WATER RESISTANT PAPER (B,C, ETC.) OVER JAMB AND HEAD FLANGES IN SHINGLE BOARD FASHION.

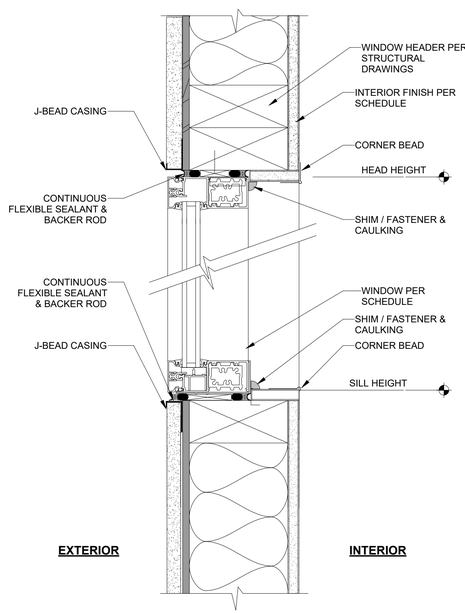
WINDOW FLASHING DETAIL1 — G1
1" = 1'-0"

INTERIOR



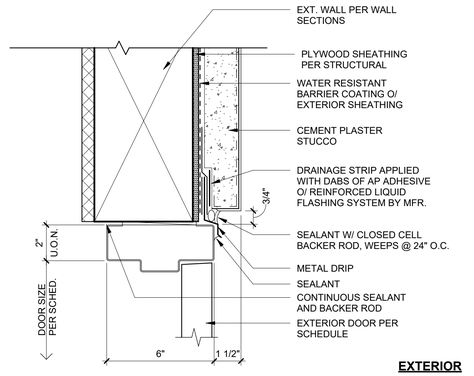
EXTERIOR

WINDOW DETAIL - EXTERIOR JAMB1 — E10
3" = 1'-0"



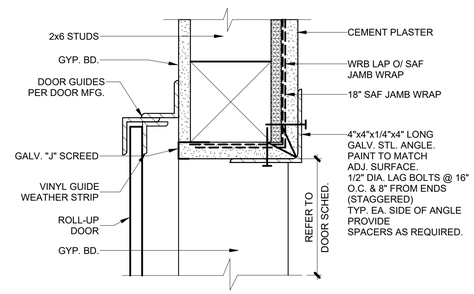
EXTERIOR **INTERIOR**

WINDOW DETAIL - VERTICAL SECTION1 — A10
3" = 1'-0"

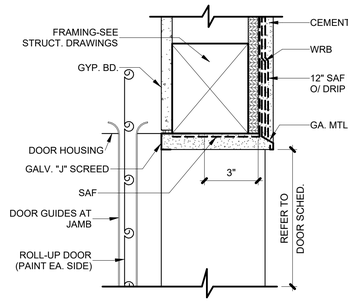


INTERIOR **EXTERIOR**

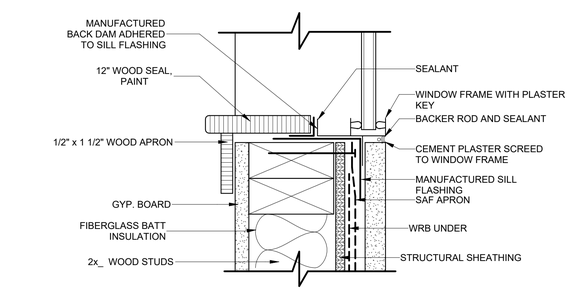
DOOR HEAD - EXTERIOR — D6
3" = 1'-0"



ROLL-UP DOOR JAMB (STUD WALL) — D3
3" = 1'-0"



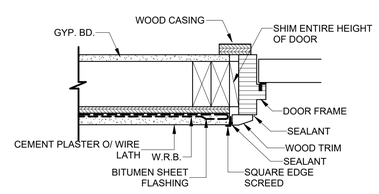
ROLL-UP DOOR HEAD (STUD WALL) — D1
3" = 1'-0"



INTERIOR **EXTERIOR**

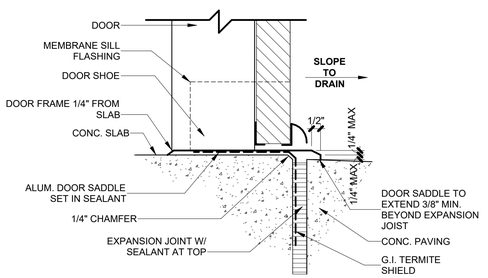
WINDOW SILL AND FLASHING1 — A6
3" = 1'-0"

INTERIOR



EXTERIOR

EXTERIOR DOOR JAMB @ STUCCO — A3
3" = 1'-0"



EXTERIOR DOOR SILL — A1
3" = 1'-0"

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24" X 36"

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TITLE

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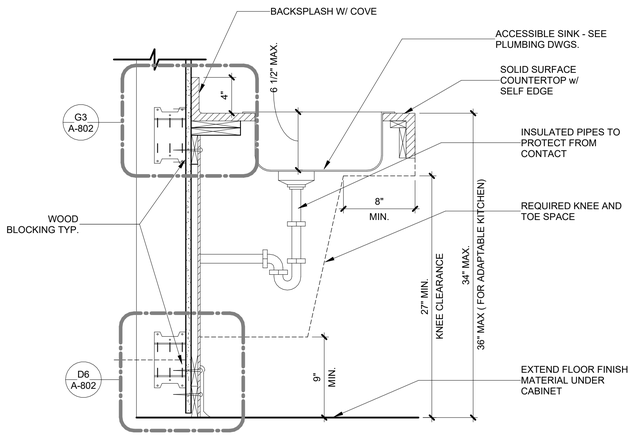
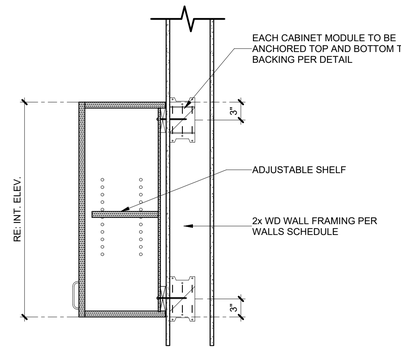


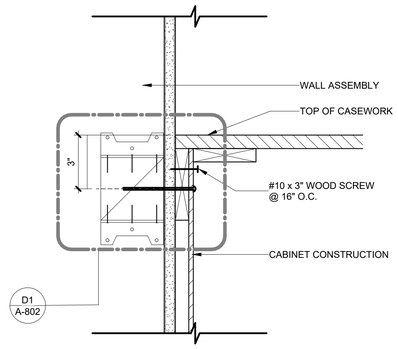
ACC. SINK BASE (OPTION FOR ADAPTABLE)) G9

1 1/2" = 1'-0"



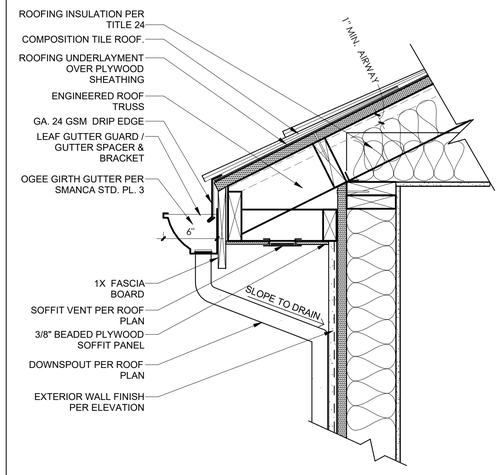
UPPER CABINET G6

1" = 1'-0"



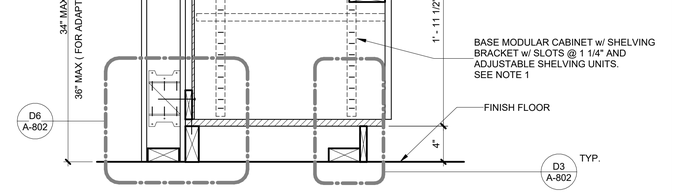
CASEWORK TO WALL (TOP) G3

3" = 1'-0"



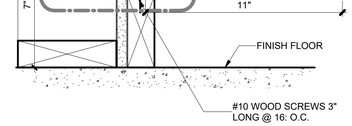
TYPICAL ROOF EAVES DETAIL G1

1 1/2" = 1'-0"



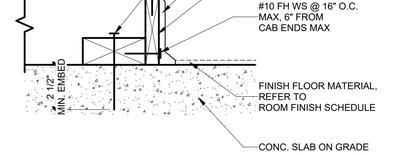
BASE CABINET W/ DRAWER D9

1 1/2" = 1'-0"



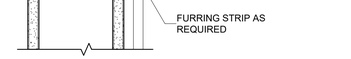
CASEWORK TO STUD WALL D6

3" = 1'-0"



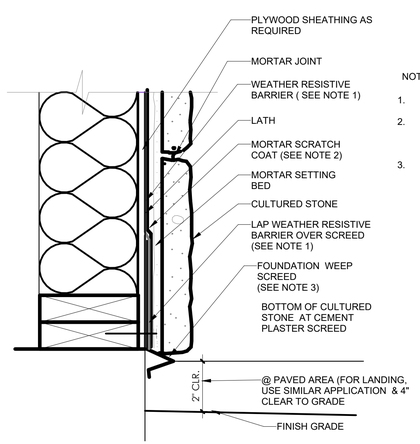
BASE CABINET ANCHORAGE D3

3" = 1'-0"



CASEWORK BACKING @ WD STUD D1

3" = 1'-0"

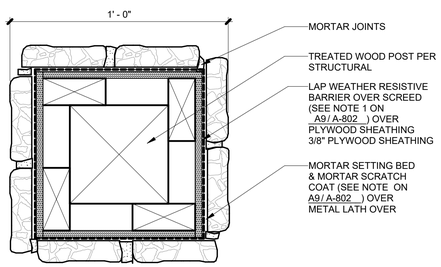


NOTES:

1. PROVIDE MINIMUM 6" VERTICAL LAPS AND 3" HORIZONTAL LAPS. BASE COAT OF MORTAR CONSISTING OF CEMENT PLASTER SHALL COVER THE LATH AND BE 3/8" MINIMUM THICKNESS.
2. PROVIDE WEEP SCREED BEHIND THE CULTURED STONE VENEER AT THE BOTTOM OF FRAMED WALL WITH THE MORTAR SETTING BED. USE A # 7- OR # 36-TYPE SCREED WITH A 3-1/2" VERTICAL LEG MINIMUM . ADJUST THE GROUND DEPTH FOR THE THICKNESS OF THE SCRATCH COAT AND MORTAR SETTING BED.
3.

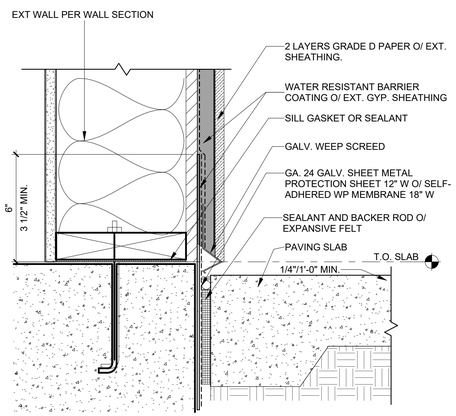
CULTURED STONE WALL DETAIL A9

3" = 1'-0"



WRAPPED POST W/ CULTURED STONE WALL A6

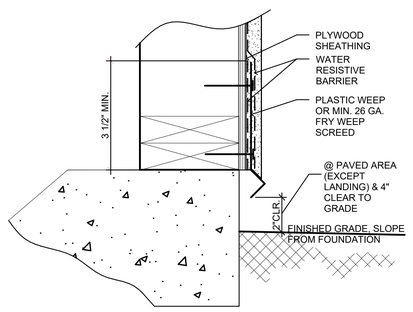
3" = 1'-0"



NOTE: COMPLY WITH ASTM C1096 AND 2022 CBC 2512.1 AND 2512.2

WEEP SCREED ADJ. TO PAVED WALK A3

3" = 1'-0"



TYPICAL WEEP SCREED DETAIL A1

3" = 1'-0"

1/2/2024 4:32:39 PM

24" X 36"

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PWP23-005

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CAPITAL PROJECTS DIVISION

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SEAL & SIGNATURE

LICENSED ARCHITECT
ROBINA R WRIGHT
NO. C-32283
RENEWAL DATE 06/30/2025
STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

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SCALE As indicated

A-802

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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Author	Checker

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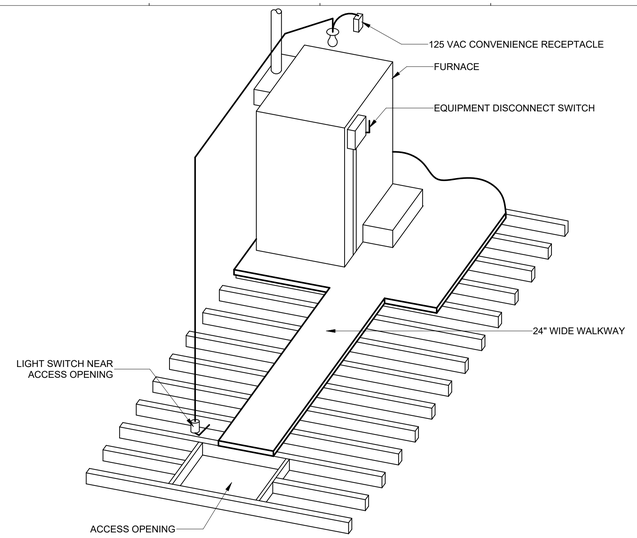
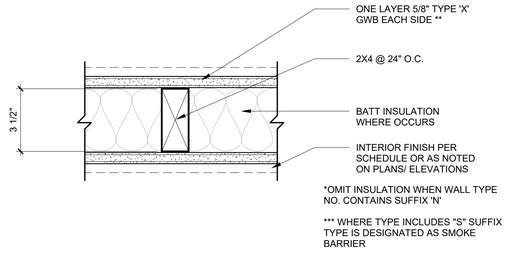


ATTIC FURNACE ISOMETRIC DETAIL — G9
3/16" = 1'-0"



*OMIT INSULATION WHEN WALL TYPE NO. CONTAINS SUFFIX 'N'

*** WHERE TYPE INCLUDES "S" SUFFIX TYPE IS DESIGNATED AS SMOKE BARRIER

TABLE 721.1 (2) ITEM NO. 14-1.3 [L,M].
1-HOUR RATING
2" X 4" WOOD STUDS 24" ON CENTER WITH 5/8" TYPE X GYPSUM WALLBOARD"'APPLIED VERTICALLY OR HORIZONTALLY NAILED WITH 6D COOLER OR WALLBOARD NAILS AT 7" ON CENTER WITH END JOINTS ON NAILING MEMBERS. STAGGER JOINTS EACH SIDE.

L. WOOD STRUCTURAL PANELS SHALL BE PERMITTED TO BE INSTALLED BETWEEN THE FIRE PROTECTION AND THE WOOD STUDS ON EITHER THE INTERIOR OR EXTERIOR SIDE OF THE WOOD FRAME ASSEMBLIES IN THIS TABLE, PROVIDED THAT THE LENGTH OF THE FASTENERS USED TO ATTACH THE FIRE PROTECTION IS INCREASED BY AN AMOUNT NOT LESS THAN THE THICKNESS OF THE WOOD STRUCTURAL PANEL.

M. FOR STUDS WITH A SLENDERNESS RATIO, L/D, GREATER THAN 33, THE DESIGN STRESS SHALL BE REDUCED TO 78 PERCENT OF ALLOWABLE F'C. FOR STUDS WITH A SLENDERNESS RATIO, L/D, NOT EXCEEDING 33, THE DESIGN STRESS SHALL BE REDUCED TO 78 PERCENT OF THE ADJUSTED STRESS F'C CALCULATED FOR STUDS HAVING A SLENDERNESS RATIO L/D OF 33.

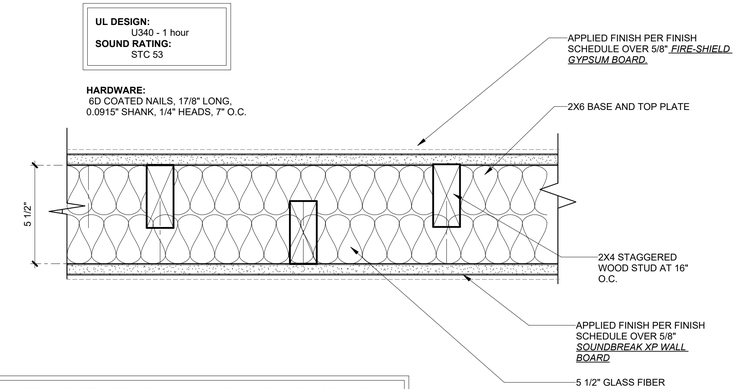
N. FOR PROPERTIES OF COOLER OR WALLBOARD NAILS, SEE ASTM C514, ASTM C547 OR ASTM FI 667.

1 HR RATED INTERIOR WALL — G5
3" = 1'-0"

NGC 2011003

UL DESIGN: U340 - 1 hour
SOUND RATING: STC 53

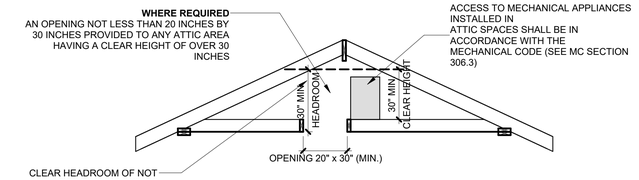
HARDWARE:
6D COATED NAILS, 17/8" LONG, 0.0915" SHANK, 1/4" HEADS, 7" O.C.



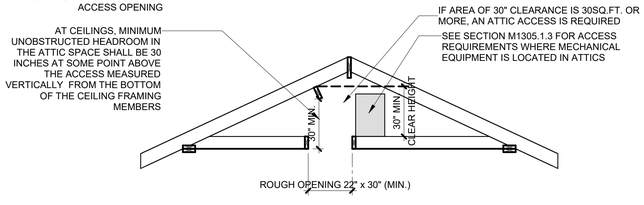
NOTE: WHERE WOOD STRUCTURAL PANELS (PLYWOOD) IS INSTALLED UNDER GYPSUM WALLBOARD AS PART OF ANY FIRE RATED ASSEMBLY, THE LENGTH OF THE FASTENERS INDICATED IN DETAILS AND GYPSUM ASSOCIATION MANUAL LISTINGS SHALL BE INCREASED BY NOT LESS THAT THE THICKNESS OF THE PLYWOOD IN CONFORMANCE WITH GA-600-2021 FIRE RESISTANCE RATING AND SOUN D CONTROL DESIGN MANUAL.

1- HR WALL ASSEMBLY (STAGGERED) — G1
3" = 1'-0"

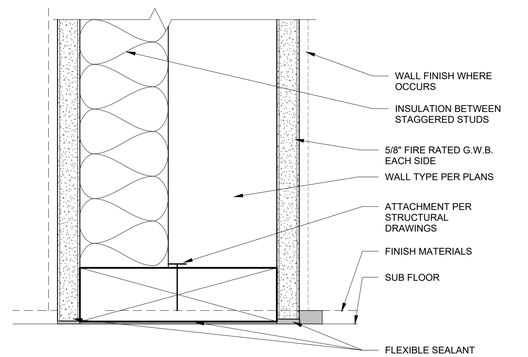
BUILDING CODE REQUIREMENTS - ATTIC ACCESS



RESIDENTIAL CODE REQUIREMENTS - ATTIC ACCESS



ATTIC ACCESS — D9
3/8" = 1'-0"



1 HR RATED WALL BASE — D5
6" = 1'-0"

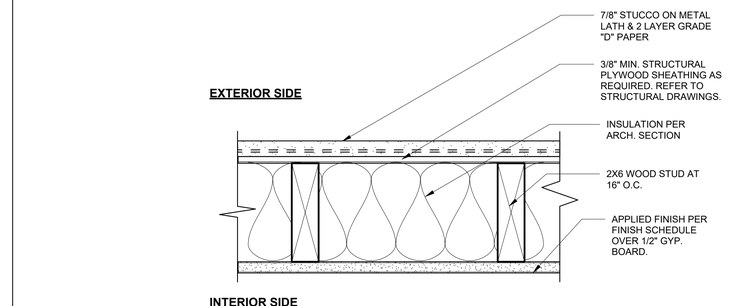
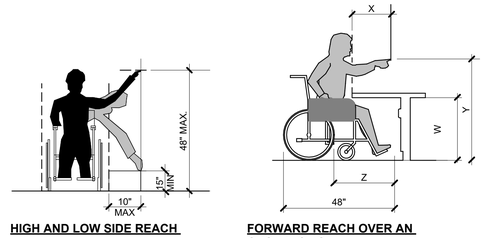


TABLE 721.1 (2) ITEM NO. 16-1.3
1-HOUR RATING
2" X 6" WOOD STUDS AT 16" CENTERS WITH DOUBLE TOP PLATES, SINGLE BOTTOM PLATES; INTERIOR SIDE COVERED WITH 5/8" TYPE X GYPSUM WALLBOARD, 4" WIDE, APPLIED VERTICALLY WITH ALL JOINTS OVER FRAMING OR BLOCKING AND FASTENED WITH 2 1/4" TYPE S DRYWALL SCREWS SPACED 7" ON CENTER. JOINTS TO BE COVERED WITH TAPE AND JOINT COMPOUND. EXTERIOR COVERED WITH 3/8" WOOD STRUCTURAL PANELS, APPLIED VERTICALLY WITH EDGES OVER FRAMING OR BLOCKING AND FASTENED WITH 6d COMMON NAILS (BRIGHT) AT 12" ON CENTER IN THE FIELD AND 6" ON CENTER ON PANEL EDGES. R-19 MINERAL FIBER INSULATION INSTALLED IN STUD CAVITY.

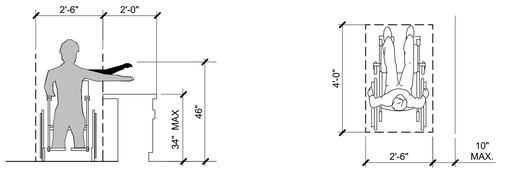
EXTERIOR WALL ASSEMBLY - CEMENT PLASTER — D1
3" = 1'-0"



FORWARD REACH TO WALL MOUNTED OBJECTS

HIGH AND LOW SIDE REACH LIMIT

FORWARD REACH OVER AN OBSTRUCTION



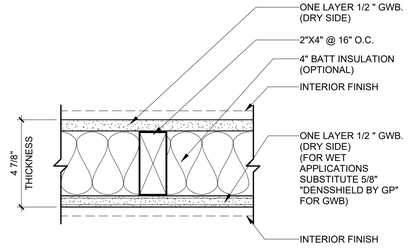
MAXIMUM SIDE REACH OVER OBSTRUCTION

CLEAR FLOOR SPACE AT PARALLEL APPROACH

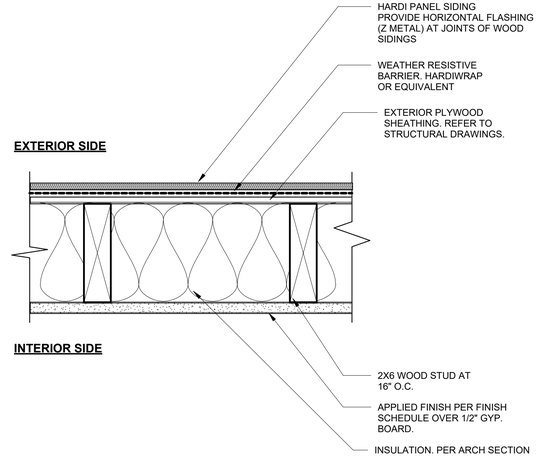
NOTES:

X SHALL BE LESS THAN, OR EQUAL TO 25".
Z SHALL BE GREATER THAN, OR EQUAL TO X.
WHEN X IS 20" TO 25" THEN Y SHALL BE 44" MAXIMUM.
W=27" MIN. WHEN X<20" & 30" MIN. WHEN X>20".

TYPICAL REACH RANGES — A8
3/8" = 1'-0"



INTERIOR NON- RATED WALL — A5
3" = 1'-0"



EXTERIOR WALL ASSEMBLY - HARDI PANEL SIDING — A1
3" = 1'-0"

1/2/2024 4:32:40 PM
24" X 36"

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LICENSED ARCHITECT — ROBERT R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

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ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY: Author	CHECKED BY: Checker

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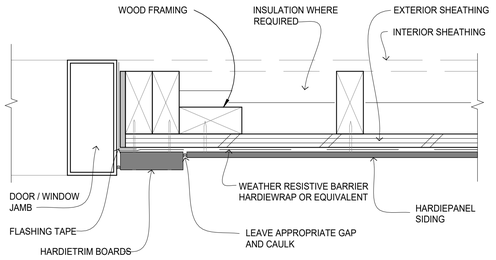
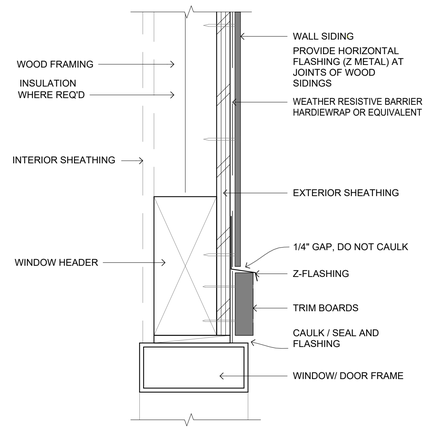
NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



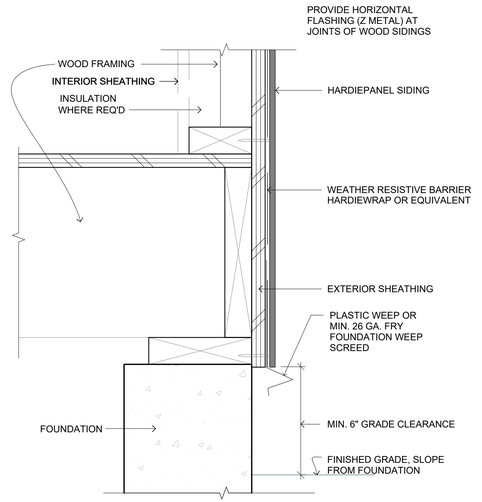
DOOR / WINDOW JAMB DETAIL F10
3" = 1'-0"

NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



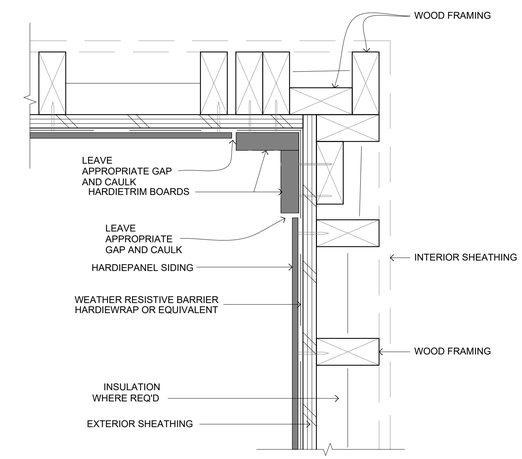
DOOR / WINDOW HEAD F7
3" = 1'-0"

NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



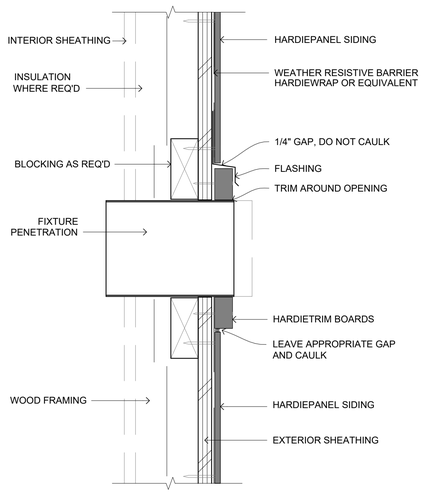
WEEP SCREED AT GRADE (HARDI WALL) F4
3" = 1'-0"

NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



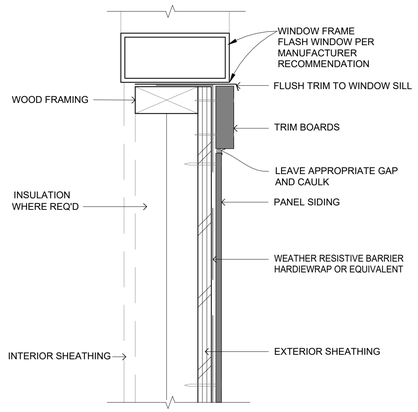
INSIDE CORNER CONDITION AT HARDI WALL F1
3" = 1'-0"

NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



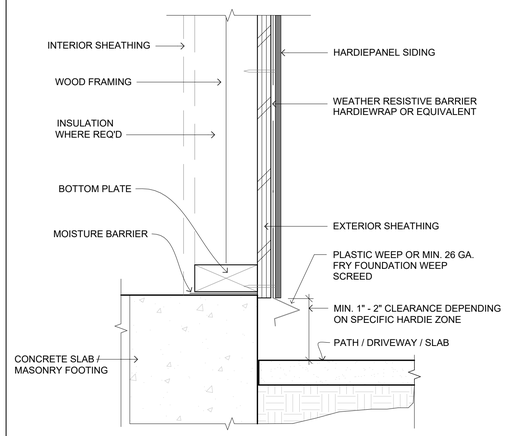
FIXTURE PENETRATION @ HARDI WALL A10
3" = 1'-0"

NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



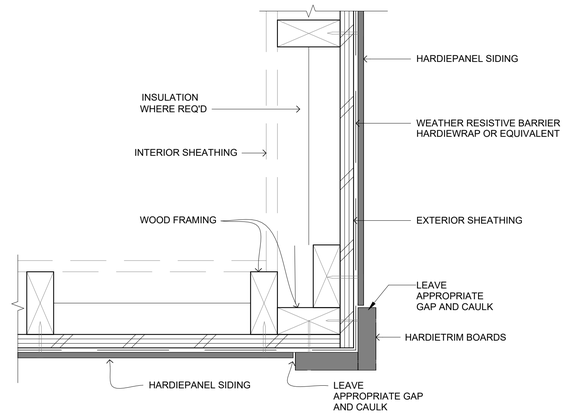
WINDOW SILL A7
3" = 1'-0"

NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



WEEP SCREED @ PAVED SURFACE (HARDI) A4
3" = 1'-0"

NOTE:
PROVIDE HORIZONTAL FLASHING (Z METAL) AT JOINTS
OF WOOD SIDINGS



OUTSIDE CORNER DETAIL (HARDI WALL) A1
3" = 1'-0"

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24" X 36"

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ROBINA R. WRIGHT
NO. C-32283
RENEWAL DATE 08/30/2025
STATE OF CALIFORNIA

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JAN. 02, 2024

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TITLE

WALL SIDING TYPICAL DETAILS

SCALE 3" = 1'-0"

A-804

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Author	Checker

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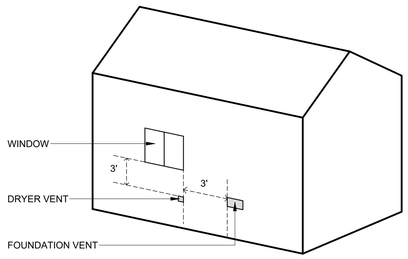
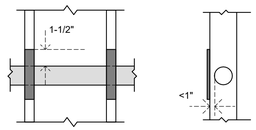


DUCT TERMINATION

DUCT TERMINATIONS SHALL BE:
- 3FT FROM PROPERTY LINE
- 10FT MIN. FROM A FORCED AIR INLET
- 3FT FROM OPENINGS INTO THE BUILDING



STEEL NAIL PLATE (316.6)

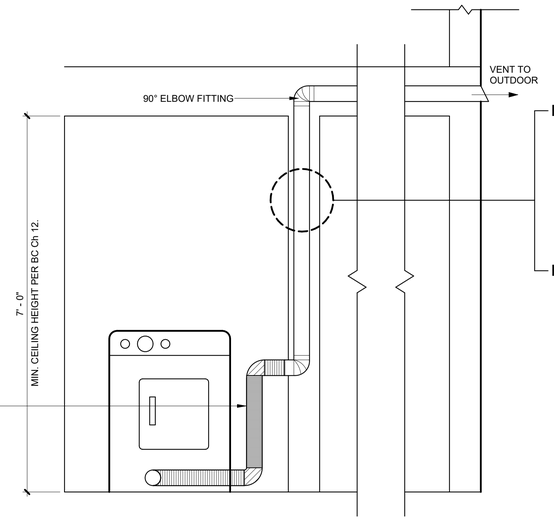
WHEN THE DUCT PENETRATES FRAMING MEMBERS TO WITHIN 1 INCH OF THE EXPOSED FRAMING, STEEL NAIL PLATES, MIN. 18 GAUGE IN THICKNESS, SHALL BE INSTALLED EXTENDING NOT LESS THAN 1-1/2" BEYOND THE OUTSIDE DIAMETER OF THE DUCT.

TRANSITION DUCT (504.4.2.2)

- LISTED AND LABELED IN ACCORDANCE WITH UL 2158A
- SHALL BE A SINGLE LENGTH OF 6' MAX.
- ONLY BETWEEN TYPE 1 DRYER AND EXHAUST DUCT
- SHALL NOT BE CONCEALED WITHIN CONSTRUCTION.

EXHAUST DUCT TERMINATION (502.2.1)

- SHALL TERMINATE TO THE OUTSIDE OF THE BUILDING
- EQUIPPED WITH A BACKDRAFT DAMPER
- NO SCREENS SHALL BE INSTALLED AT DUCT TERMINATION.
- NO DEVICE SUCH AS FIRE OR SMOKE DAMPERS THAT WILL OBSTRUCT THE FLOW OF EXHAUST SHALL BE INSTALLED



COMMON EXHAUST DUCT (504.4.4)

WHERE PERMITTED BY MANUFACTURER'S INSTALLATION INSTRUCTIONS, MULTIPLE CLOTHES DRYER SHALL BE PERMITTED TO BE INSTALLED WITH A COMMON EXHAUST.

- SHALL BE CONSTRUCTED OF 24 GAUGE RIGID METAL (MIN. 0.020" THICK)
- INSTALLED IN A FIRE RESISTANT RATED ENCLOSURE.
- ENCLOSURE SHALL BE PROVIDED WITH A CLEANOUT OPENING AT THE BASE. MIN 12" x 12"
- EXHAUST FAN LOCATED DOWNSTREAM OF BRANCH CONNECTIONS, OPERATED CONTINUOUSLY AND MONITORED BY AN APPROVED MEANS.

EXHAUST DUCT - TYPE 1 (504.4.2)

- MIN 0.016 INCH IN THICKNESS
- MIN 4" NOMINAL DIAMETER
- NOT TO EXCEED TOTAL COMBINED HORIZONTAL AND VERTICAL LENGTH OF 14', INCLUDING TWO 90° ELBOWS. A LENGTH OF 2' SHALL BE DEDUCTED FOR EACH 90° ELBOW IN EXCESS OF TWO.
- DUCTS SHALL BE SUPPORTED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE

EXHAUST DUCT - TYPE 2 (504.4.3.2)

- CONSTRUCTED OF SHEET METAL OR OTHER NONCOMUBSTIBLE MATERIAL EQUIVALENT IN STRENGTH AND CORROSION RESISTANCE TO GALVANIZED SHEET STEEL NOT LESS THAN 0.0195 INCH THICK.
- EQUIPPED OR INSTALLED WITH LINT-CONTROLLING MEANS .
- INSTALLED WITH MINIMUM CLEARANCE OF 6" FROM ADJACENT COMBUSTIBLE MATERIAL
- WHEN PASSING THROUGH WALLS, FLOOR, OR PARTITIONS, THE SPACE AROUND THE DUCT SHALL BE SEALED WITH NONCOMBUSTIBLE MATERIAL. [NFPA 54: 10.4.5.5.]

CLOTHES DRYER EXHAUST **E5**
3/4" = 1'-0"

1/2/2024 4:32:41 PM
24" X 36"

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT ★ ROBINA R. WRIGHT ★ STATE OF CALIFORNIA
NO. C-32283
RENEWAL DATE 06/30/2025

UPDATE

JAN. 02, 2024

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TITLE

CLOTHES DRYER EXHAUST DETAILS

SCALE 3/4" = 1'-0"

A-805

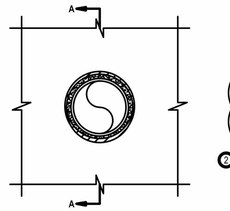
ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

©

System No. W-L-2406

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0, 1/2 and 3/4 Hr (See Item 2)
L Rating At Ambient - 1.2 CFM/sq ft (See Item 3B)
L Rating At 400 F - Less Than 1 CFM/sq ft (See Item 3B)

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — One or two layers of nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. See Table under Item 3B for max diam of opening.
2. Through-Penetrants — One nonmetallic pipe installed within the firestop system. See Table under Item 3B for annular space required in the firestop system. Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping system.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.

   The T Rating for 2 hr fire-rated walls is 0 hr. The T Rating for 1 hr fire-rated walls is 3/4 hr for nom 1-1/2, 2 and 3 in. (38, 51 and 76 mm) diam through penetrants. The T Rating for 1 hr fire-rated walls is 1/2 hr for nom 4 and 6 in. (102 and 152 mm) diam through penetrants.
3. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material* — Wrap Strip — See Table under Item 3B for min size of intumescent wrap strip. The wrap strip is continuously wrapped around the outer circumference of the pipe once and slid into the annular space such that approx 1/8 in. (3 mm) of the wrap strip protrudes from the wall surface. Wrap strip is held in place with integral fastening tape. Wrap strip installed on each surface of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 648S - 1.5" US, CP 648S - 2" US, CP 648S - 3" US, CP 648S - 4" US and CP 648S - 6" US
   B. Fill, Void or Cavity Material* — Caulk — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. For 2 hr fire-rated walls, 1/4 in. (6 mm) bead fill material also applied at wrap strip/gypsum wall interface. In 1 hr fire-rated walls, fill material is optional for nom 1-1/2, 2, 3 and 4 in. (38, 51, 76 and 102 mm) diam penetrants. In 2 hr fire-rated walls, fill material is optional for nom 1-1/2, 2 and 3 in. (38, 51 and 76 mm) diam penetrants. Fill material is required to be used to attain L Ratings.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

Nom Pipe Diam, in. (mm)	Wrap Strip	Wrap Strip Size, thick. X width, in. (mm)	Max Diam of Opening, in. (mm)	Annular Space, in. (mm)	
				Min	Max
1-1/2 (38)	CP 648S - 1.5" US	3/16 x 1 (5 x 25)	2-3/8 (60)	3/16 (5)	5/16 (8)
2 (51)	CP 648S - 2" US	3/16 x 1 (5 x 25)	3 (76)	3/16 (5)	5/16 (8)
3 (76)	CP 648S - 3" US	3/16 x 1-3/4 (5 x 44)	4 (102)	3/16 (5)	5/16 (8)
4 (102)	CP 648S - 4" US	3/8 x 1-3/4 (10 x 44)	5-3/8 (137)	3/8 (10)	1/2 (13)
6 (152)	CP 648S - 6" US	1/2 x 1-3/4 (13 x 44)	8 (203)	9/16 (14)	13/16 (21)

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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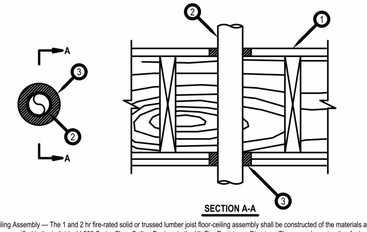
System No. F-C-2160

F Rating — 1 and 2 Hr
T Rating — 1 and 2 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Floor-Ceiling Assembly — The 1 and 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels (Not Shown) — Resilient galv steel furring installed perpendicular to wood joists between first and second layers of wallboard (Item 1D). Furring channels spaced max 24 in. (610 mm).
   D. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of wallboard nailed to wood joists. Second layer of wallboard screw-attached to furring channels. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).

1.1 Chase Wall — (Optional, not Shown) — The through penetrants (Item No. 2) may be routed through a fire-rated single, double or staggered wood stud/gypsum wall board chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) or parallel nom 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening shall be 2 in. (51 mm) larger than the nom diam of through penetrant (Item 2).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Through Penetrants — One nonmetallic pipe or conduit to be installed concentrically or eccentrically within the firestop system. Annular space between pipe or conduit and edge of opening to be min 1/2 in. (13 mm) and max 1-1/8 in. (29 mm). Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
3. Fill, Void or Cavity Materials*-Sealant — Fill Material forced into annular space to fill space to max extent possible. Sealant shall be installed flush with top surface of floor or sole plate and bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

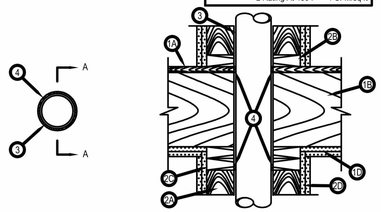
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 15, 2015

System No. F-C-1009

Classified by Underwriters Laboratories, Inc. to UL 1479 and CAN/ULC-S115

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 1/4 Hr	FT Rating — 1/4 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 1/4 Hr
	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft



SECTION A-A

1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F Rating of the firestop system is equal to the rating of the floor-ceiling assembly. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening to be max 1 in. (25 mm) larger than diam of pipe. As an alternate, the opening may be square-cut with a max dimension 1 in. (25 mm) greater than the diam of the pipe.
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels — (Not Shown) —(As required) Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Diam of opening to be max 1 in. (25 mm) larger than diam of pipe.
2. Chase Wall — (Optional) - The through penetrant (Item 3) may be routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum board chase wall having a fire rating consistent with that of the floor-ceiling assembly. Depth of chase wall to be min 1 in. greater than the diameter of the through penetrant. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs. Nom 2 by 4 in. (51 by 102 mm) studs are allowed for through-penetrants (Item 3) not exceeding nom 2 in. (51 mm) diam.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is to be max 1 in. (925 mm) larger than diam of pipe. As an alternate, the opening may be square-cut with a max dimension 1 in. (25 mm) greater than the diam of the pipe. Plates may be discontinuous over opening, terminating at two opposing edges of opening. Max length of discontinuity to be 1 in. (25 mm) greater than diam of through penetrant.
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Diam of opening is to be max 1 in. (25 mm) larger than diam of pipe. As an alternate, the opening may be square-cut with a max dimension 1 in. (25 mm) greater than the diam of the pipe. Plates may be discontinuous over opening, terminating at two opposing edges of opening. Max length of discontinuity to be 1 in. (25 mm) greater than diam of through penetrant.
   D. Steel Plate — When lumber plates are discontinuous, nom 1-1/2 in. (38 mm) wide No. 20 gauge (or heavier) galv steel plates shall be installed to connect each discontinuous lumber plate and to provide a form for the fill material. Steel plates sized to lap 2 in. (51 mm) onto each discontinuous lumber plate and secured to lumber plates with steel screws or nails.
   E. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Through Penetrants — One metallic pipe, conduit or tubing to be installed within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor assembly. The annular space within the firestop system shall be min 0 in. (point contact) to max 1 in. (25 mm). The following types and sizes of metallic pipes or conduits may be used:
   A. Steel Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 4 in. (102 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or steel conduit.
   D. Copper Tubing — Nom (102 mm) 4 in. diam (or smaller) Type L (or heavier) copper tubing.
   E. Copper Pipe — Nom (102 mm) 4 in. diam (or smaller) Regular (or heavier) copper pipe.
4. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with the top surface of the floor or the sole plate. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S, CFS-S SIL GG, CP606, FS-One Sealant or FS-ONE MAX Intumescent Sealant (Note: L Ratings apply only when FS-ONE Sealant is used.)

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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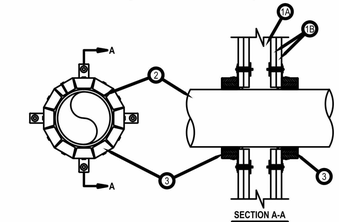
System No. W-L-2078

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0, 1 and 2 Hr (See Items 2 and 3)
L Rating At Ambient — 3 CFM/sq ft
L Rating At 400 F — Less Than 1 CFM/sq ft

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Wall Assembly — The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL fire Resistance Directory and shall include the construction features noted below:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Max diam of opening is 11-1/2 in. (292 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through-Penetrants — One nonmetallic pipe, conduit or tubing to be installed within the firestop system. The annular space between pipe and periphery of opening shall be min 0 in. (point contact) to max 1/2 in. (13 mm). Pipe or conduit to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) Schedule 40 solid-core or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 10 in. (254 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid-core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems
   D. Flame Retardant Polypropylene (FRPP) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 FRPP pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
   E. Polyvinylidene Fluoride (PVDF) Pipe — Nom 4 in. (102 mm) diam (or smaller) PVDF pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.

   When max 6 in. diam pipe is used, T Rating is equal to the hourly fire rating of the wall. When nom 8 in. or 10 in. (203 or 254 mm) diam pipe is used, T Rating is 0 hr.
3. Firestop Device* — Firestop Collar — Firestop collar shall be installed in accordance with the accompanying installation instructions. Collar to be installed with kitchen sheet around the pipe and secured to both sides of the wall using the anchor hooks provided with the collar. (Minimum two anchor hooks for 1-1/2 and 2 in. (38 and 51 mm) diam pipes, three anchor hooks for 3 and 4 in. (76 and 102 mm) diam pipes, four anchor hooks for 6 in. (152 mm) diam pipes, ten anchor hooks for 8 in. (203 mm) diam pipes and twelve anchor hooks for 10 in. (254 mm) diam pipes. The anchor hooks are to be secured to the surface of wall with 3/16 in. (4.8 mm) diam by 2-1/2 in. (64 mm) long steel toggle bolts along with washers. As an alternate for pipe sizes of nom 4 in. diam or less, min No. 10 by 1-1/2 in. (254 by 38 mm) long drywall or laminate screws with min 3/4 in. (19 mm) steel washers may be used. When the drywall or laminate screw is used, T Rating shall not exceed 1 hr.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 643 50/1.5"N, CP 643 63/2"N, CP 643 90/3"N, CP 643 110/4"N, CP 643 160/6"N, CP 644 200/8" andCP 644 250/10" Firestop Collars
4. Fill, Void or Cavity Material* — Sealant - (Not Shown) — Min 1/2 in. (13 mm) thickness of sealant applied within the annular space for nom 8 in. and 10 in. (203 and 254 mm) diam pipes, flush with each side of wall. Sealant in annular space is optional for max 6 in. (152 mm) diam pipes. A min 1/4 in. (6 mm) thickness of sealant is required within the annular space, flush with each side of wall, to attain the L Ratings for max 6 in. (152 mm) diam pipes.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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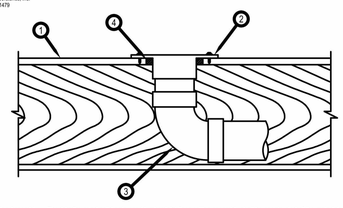
Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   - ** Minimum and maximum Width of Joints*
   - ** Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   - ** 2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   - ** NFPA 101 Life Safety Code*
   - ** All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   - ** ATTENTION: Fire Rated Assembly*
   - ** UL System #*
   - ** Product(s) used*
   - ** Hourly Rating (F-Rating)*
   - ** Installation Date*

System No. F-C-2203

F Rating — 1 Hr
T Rating — 1 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479



1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5 in. (127 mm).
   B. Wood Joist* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 5/8 in. (16 mm) thick, 4 ft (1.2 m) wide as specified in the individual Floor-Ceiling Design.
2. Closet Flange — Acrylonitrile butadiene styrene (ABS) or polyvinyl chloride (PVC) closet stub sized to accommodate drain pipe. Closet flange installed over drain piping within floor opening with flange secured to plywood floor with steel screws. Diam of circular opening through flooring (Item 1A) to be max 1/2 in. (13 mm) larger than outside diam of closet flange.
3. Drain Piping — Nom 4 in. (102 mm) diam (on smaller) Schedule 40 acrylonitrile butadiene styrene (ABS) or polyvinyl chloride (PVC) drain pipe and 90 degree elbow for use in vented (drain, waste or vent) piping systems. Pipe installed concentrically within firestop system.
4. Fill, Void or Cavity Materials*—Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with the bottom surface of floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
5. Water Closet — (Not Shown)—Floor mounted vitreous china water closet.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

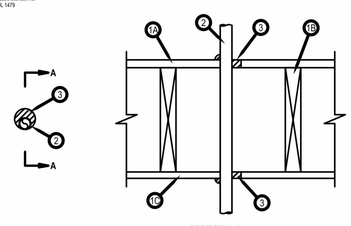
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 15, 2015

System No. F-C-2334

F Rating — 1 Hr
T Rating — 1 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Designs in the UL Fire Resistance Directory, as summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 2 in. (51mm).
   B. Wood Joists — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board secured to joists as specified in the individual Floor-Ceiling Design. Max diam of opening is 2 in. (51 mm).
2. Through Penetrants — One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. The annular space within the firestop system shall be min 0 in. (point contact) to max 7/8 in. (22 mm). Pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Crosslinked Polyethylene (PEX) Tubing — Nom 1 in. (25 mm) diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
3. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material* - Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within annulus, flush with top surface of subfloor. Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with bottom surface of ceiling. At point contact locations, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the penetrant/gypsum board and penetrant/flooring interface.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

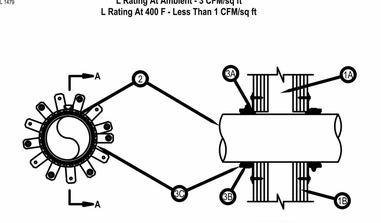
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 20, 2015

System No. W-L-2447

F Ratings - 1, 2, 3 and 4 Hr (See Item 1)
T Ratings - 1, 2, 3 and 4 Hr (See Item 2)
L Rating At Ambient - 3 CFM/sq ft
L Rating At 400 F - Less Than 1 CFM/sq ft

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Wall Assembly — The 1, 2, 3 or 4 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of min 3-1/2 in. (89 mm) wide steel channel studs spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Min 1/2 in. (13 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partiton Design in the UL Fire Resistance Directory. Max diam of opening is 7 in. (178 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One nonmetallic pipe to be installed concentrically or eccentrically within the firestop system. Annular space between pipe and periphery of opening to be min 0 in. (point contact) and max 1/2 in. (13 mm). Pipe to be rigidly supported on both sides of wall assembly. The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid or cellular core PVC for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 6 in. (152 mm) diam (or smaller) SDR13.5 CPVC for use in closed (process or supply) piping systems.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 solid or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.

   The hourly T Rating of the firestop system is 1 hr except that for nom 2 in. (51 mm) diam (or smaller) penetrants, the hourly T Rating is equal to the hourly fire rating of the wall assembly in which it is installed.
3. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Materials*- Sealant — Min 1/4 in. (6 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
   B. Fill Void or Cavity Material* - Wrap Strip — Nom 3/16 in. (5 mm) thick by 1-3/4 in. (45 mm) wide intumescent wrap strip continuously wrapped around the pipe. Wrap strip butted tightly against both surfaces of wall. The number of layers of wrap strip required depends on penetrant size as specified in the Table below.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP648-E-W45/1-3/4

Nom Pipe Diam, in.	No. of Layers of Wrap Strip Required
6 (or smaller)	3
4 (or smaller)	2
2 (or smaller)	1

   C. Steel Collar — Collar fabricated from coils of precut min 0.017 in. (0.43 mm) thick (No. 28 MSG) galv steel available from the sealant manufacturer. Collar shall be nom 1-3/4 in. (45 mm) deep with 1 in. (25 mm) wide by 2 in. (51 mm) long anchors tabs on 2 in. (51 mm) centers for securement to wall assembly. The anchor tabs shall be bent 90 degree outward for securement to the wall assembly. The opposite side incorporates retainer tabs, 1/2 in. (13 mm) wide by 3/16 in. (5 mm) long, prebent toward the pipe surface. Collar shall be tightly wrapped over the wrap strip, overlapping min. 1 in. (25 mm) at seam. A nom 1/2 in. (13 mm) wide stainless steel band clamp shall be secured to the collar at its mid-height. Anchor tabs of collar secured to surface of wall by means of nom 3/16 in. diam by 2-1/2 in. long steel toggle bolts in conjunction with 1-1/4 in. (32 mm) diam steel fender washers at every other anchor tab. As an alternate, in 1 and 2 hr rated walls, every anchor tab of collar may be secured to surface of wall by means of nom 1-1/4 in. (32 mm) long steel laminating drywall screws in conjunction with 1-1/4 in. (32 mm) diam steel fender washers. A collar is used on both sides of wall.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

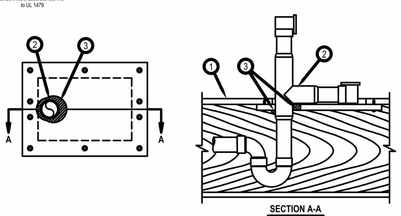
Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc. January 22, 2015

System No. F-C-2204

F Rating - 1 Hr
T Rating - 1/2 Hr

Classified by Underwriters Laboratories, Inc. to UL 1479



SECTION A-A

1. Floor — Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in theUL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Rectangular cutout in flooring to accommodate the bathtub drain piping (Item 2) to be max 8 in. by 12 in. (203 by 305 mm). Cutout to be patched on underside of subfloor using one layer of min 3/4 in. (19 mm) thick plywood or min 5/8 in. (16 mm) thick gypsum board (Item 1C) sized to lap min 2 in. (51 mm) beyond each edge of rectangular cutout. Patch split into two pieces at opening and hole-sawed for bathtub drain piping. Diam of opening hole sawed through patch to accommodate drain piping (Item 2) to be 1 in. (25 mm) larger than outside diam of drain piping and positioned such that the annular space between drain piping and periphery of opening is min 0 in. (point contact) to max 1 in. (25 mm). Two pieces positioned around drain piping, with cut edges tightly butted, and screw-attached to underside of subfloor with 1-1/4 in. (32 mm) long steel screws spaced max 6 in. (152 mm) OC.
   B. Wood Joists* — Nom 10 in. (154 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 5/8 in. (16 mm) thick, 4 ft (122 cm) wide as specified in the individual Floor-Ceiling Design.
2. Drain Piping — Nom 1-1/2 in. (38 mm, or smaller) diam Schedule 40 acrylonitrile butadiene styrene (ABS) or polyvinyl chloride (PVC) pipe and drain fittings cemented together and provided with ABS or PVC bathtub waste/overflow fittings. Annular space shall be min 0 in. (point contact) to max 1 in.
3. Fill Void or Cavity Materials* — Min 5/8 in. (16 mm) depth or fill material applied within the annulus, flush with both surfaces of plywood or gypsum board patch.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE-MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT — ROBINA R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

TYPICAL FIRESTOP DETAILS

SCALE 12" = 1'-0"

A-806

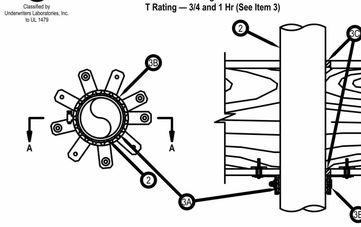
ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

©

1/2/2024 4:32:43 PM
24" X 36"

System No. F-C-2232

F Rating — 1 Hr
T Rating — 3/4 and 1 Hr (See Item 3)



SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5 in. (127 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 5/8 in. (16 mm) thick, 4 ft (122 cm) wide as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5 in. (127 mm).
2. Through Penetrants — One nonmetallic pipe or conduit to be installed concentrically or eccentrically within the firestop system. Annular space between pipe or conduit and edge of opening to be min 0 in. (point contact) and max 1/2 in. (13 mm). Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 4 in. (102 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. Acrylonitrile Butadiene Styrene (ABS) Pipe — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 solid or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
3. Nonmetallic Pipe Coupling — (Optional) Nom 4 in. (102 mm) diam (or smaller) Schedule 40 PVC, Schedule 40 ABS or SDR13.5 CPVC coupling corresponding to pipe type installed such that the top of the coupling is flush with the bottom surface of the ceiling and extending downward.
4. Firestop System — The firestop system shall consist of the following:
   A. Fill, Void or Cavity Material* - Wrap Strip — Nom 3/16 in. (5 mm) thick by 1-3/4 in. (44 mm) wide intumescent wrap strip. Layers of wrap strip continuously wrapped around the pipe and held in place with tape. Wrap strip butted tightly against surface of ceiling.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP648-E W45/1-3/4" Wrap Strip

Nom Diam of Pipe, in. (mm)	Number of Wrap Strips	Min/Max Annular Space, in. (mm)	T-Rating - Hr.
2 (51)	1	0-1/4 (0-6)	1
3 (76)	2	0-1/2 (0-13)	3/4
4 (102)	2	0-1/2 (0-13)	3/4

   B. Steel Collar — Collar fabricated from coils of precut min 0.017 in. (0.43 mm) thick (No. 28 MSG) galv steel available from the sealant manufacturer. Collar shall be nom 1-3/4 in. (44 mm) deep with 1 in. (25 mm) wide by 2 in. (51 mm) long anchors tabs on 2 in. (51 mm) centers for securement to floor/ceiling assembly. The opposite side incorporates retainer tabs, 1/2 in. (13 mm) wide by 3/16 in. (5 mm) long, prebent toward the pipe surface. Collar shall be tightly wrapped over the wrap strip, overlapping min. 1 in at seam. A nom 1/2 in. (13 mm) wide stainless steel hose clamp shall be secured to the collar at its mid-height. Every other anchor tab of collar secured to gypsum ceiling with 1/4 in. (6 mm) diam by 1-1/2 in. (38 mm) long steel toggle bolts in conjunction with 1/4 in. by 3/4 in. (6 by 19 mm) diameter steel washers.
   C. Fill, Void or Cavity Materials*-Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the gypsum board ceiling. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the top surface of the floor. When ABS pipe is installed at point contact, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe/floor interface on top surface of floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX SEALANT
   4A. Firestop System — (Optional, Not shown) As an option to Item 4, the firestop system shall consist of the following:
   A. Firestop Device* — Galv steel collar lined with an intumescent material sized to fit the specific diam of pipe shall be installed in accordance with the accompanying installation instructions. Collar to be installed and latched around the pipe and secured to the gypsum board ceiling with 1/4 in. diam by 1-1/2 in. (38 mm) long steel toggle bolts with 3/4 in. (19 mm) diam steel washers through hanger tabs provided.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 643 50/1.5"N, CP 643 63/2"N, CP 643 90/3"N or CP 643 110/4"N Firestop Collar.
   B. Fill, Void or Cavity Materials*-Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the gypsum board ceiling. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the top surface of the floor. When ABS pipe is installed at point contact, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe/floor interface, flush with top surface of floor.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE-MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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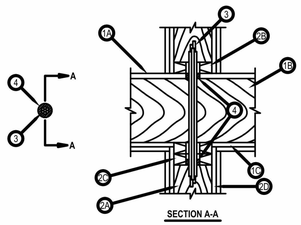
January 15, 2015

System No. F-C-3012

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0, 1 and 1-3/4 Hr (See Item 3)	FT Rating — 0, 1 and 1-3/4 Hr (See Item 3)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 0, 1 and 1-3/4 Hr (See Item 3)



SECTION A-A

1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening for 1 or 2 hr assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening for 1 or 2 hr assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   The F Rating of the firestop system is equal to the rating of the floor-ceiling assembly.
2. Chase Wall — (Optional) - The through penetrant (Item 3) shall be routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening for 1 or 2 hr rated assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening for 1 or 2 hr rated assembly is 2-1/2 in. (64 mm) or 2 in. (51 mm), respectively.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Cables — In 1 hr fire-rated assemblies, aggregate cross-sectional area of cables in opening to be max 45 percent of the cross-sectional area of the opening (max 2 in. (51 mm) diam bundle). Cables to be rigidly supported on both sides of floor assembly. Any combination of the following types and sizes of copper conductors may be used:
   A. RG 59 coaxial cable with single copper conductor, cellular polyethylene cellular foam insulation and polyvinyl chloride (PVC) jacket.
   B. Max 8/C No. 22 AWG telephone cable with polyvinyl chloride (PVC) jacketing.
   C. Max 2/C No. 12 AWG cable with polyvinyl chloride (PVC) insulation and jacketing.
   D. Max 3/C with ground No. 2/0 AWG aluminum or copper Type SER cable with polyvinyl chloride (PVC) insulation.
   E. Max 3/C with ground No. 2/0 AWG Type NM cable with polyvinyl chloride (PVC) insulation.
   F. Max 3/C No. 12 AWG MC (BX) cable with polyvinyl chloride (PVC) insulation.
   G. Max 1 in. diam metal clad TEK cable with PVC jacket.
   H. Max 4/C with ground No. 300 kcmil (or smaller) aluminum SER cable with PVC insulation and jacket.
   I. Through Penetrating Product* - Any cables, Metal-Clad Cable+ or Armored Cable+ currently Classified under the Through Penetrating Products category.
   See Through Penetrating Product (XHLY) category in the Fire Resistance Directory for names of manufacturers.
   The T Rating is 1 and 1-3/4 hr for 1 and 2 hr rated assemblies, respectively, for cables 3A through 3G. The T Rating is 0 hr for cables 3H and 3I.
4. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of fill material also applied within the annulus, flush with bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS611A Sealant or FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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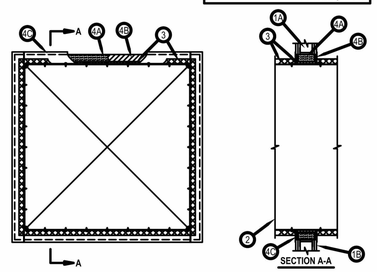
January 20, 2015

System No. W-L-7156

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 0 Hr



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be used to completely frame around opening.
   B. Gypsum Board* — Min 5/8 in. (16 mm) thick, 4 ft (1.2 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max size of opening is 210 sq in. (1355 cm2) with a max width of 14-1/2 in. (368 mm) for wood studs. Max size of opening is 76.2 sq ft. (7 m2) with a max width of 105-1/2 in. (2.7 m) for steel studs.
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall in which it is installed.
2. Steel Duct — Max 100 by 100 in. (2.5 by 2.5 m) steel duct to be installed within the framed opening. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. Steel duct to be rigidly supported on both sides of wall assembly.
3. Batts and Blankets* — Nom 1-1/2 or 2 in. (38 or 51 mm) thick glass fiber batt or blanket (min 3/4 pcf or 12 kg/m3) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed minimum 50% such that the annular space within the firestop system shall be min 1/2 in. (13 mm) to max 2 in. (51 mm).
   See Batts and Blankets (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.
4. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 3-5/8 (92 mm) or 4-7/8 in. (124 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 or 2 hr fire-rated walls, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
   C. Steel Retaining Angles — Min No. 16 gauge (0.059 in. or 1.5 mm) galv steel angles sized to lap steel duct a min of 2 in. 51 mm) and lap wall surfaces a min of 1 in. (25 mm). Angles attached to steel duct on both sides of wall with min No. 10 steel sheet metal screws spaced a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. When max duct dimension does not exceed 48 in. (122 cm) and duct area does not exceed 1300 in2 (8387 cm2), angles may be min No. 18 gauge galv steel. Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. When max 1-1/2 in. (38 mm) thick insulation is used, steel angles are optional for those sides of duct that do not exceed the dimension specified in Table below, dependent on packing material and annular space as specified.

Max Duct Dimension	Duct Thickness	Annular Space	Packing Material	Angle (Item 3C) Required
24 in. (610 mm)	24 ga or heavier	1/2 in. min to 1 in. max (13 to 25 mm)	Item 3A1	No

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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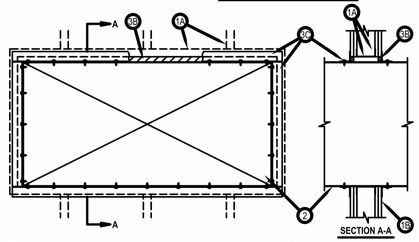
January 27, 2015

System No. W-L-7155

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 0 Hr	FT Ratings — 0 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft	FH Ratings — 1 and 2 Hr (See Item 1)
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Ratings — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft
	L Rating at 400 F — Less Than 1 CFM/sq ft



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Additional steel studs spaced max 24 in. (610 mm) OC. Additional steel studs shall be used to completely frame the opening.
   B. Gypsum Board* — 5/8 in. (16 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max area of opening is 73.7 sq ft (6.85 m2) with a max dimension of 104 in. (2.64 m).
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Duct — Max 100 in. by 100 in. (2.5 by 2.5 m) galv steel duct to be installed either concentrically or eccentrically within the firestop system. The duct shall be constructed and reinforced in accordance with SMACNA construction standards. The space between the steel duct and periphery of opening shall be min 0 in. (point contact) to max 2 in. (51 mm). Steel duct to be rigidly supported on both sides of the wall assembly.
2A1. Through-Penetrating Product* — As an alternate to Item 2. Fiber cement with galvanized steel facing, 3/8 in.(10 mm) thick composite metallic duct, with a max cross-sectional area of 43.0 sq ft, (4 m2) and a max individual dimension of 78 3/4 in. (2 m). Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
   DURASYSTEMS BARRIERS INC — Type DuraDuct HP
2A2. Through-Penetrating Product* — As an alternate to Item 2. Fiber cement with galvanized steel facing, 1/4 in. (6 mm) thick, with a max cross-sectional area of 1764 sq in. (1.14 m2), and a max individual dimension of 42 in. (1067 mm). Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of wall assembly and installed in accordance. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
   DURASYSTEMS BARRIERS INC — Type DuraDuct SD.
2A3. Through-Penetrating Product* — As an alternate to Item 2. Galvanized steel faced duct panel, with a max cross-sectional area of 2450 sq in. (1.58 m2), and a max individual dimension of 49-1/2 in. (1258 mm) Duct to be installed either concentrically or eccentrically within the firestop system such that the annular space is min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides wall assembly. Refer to Ventilation Duct Assemblies in Vol. 2 of the Fire Resistance Directory.
   DURASYSTEMS BARRIERS INC — Type DuraDuct GNX.
3 Firestop System — The firestop system shall consist of the following:
   A. Packing Material — (Optional, Not Shown) — Polyethylene backer rod, mineral wool batt insulation or fiberglass batt insulation friction fitted into annular space. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   A1. Packing Material — Required as specified in Table below. Min 3-3/4 in. (95 mm) or 5 in. (127 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 and 2 hr rated assemblies, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. Min 1/4 in. (6 mm) diam bead of fill material shall be applied at the point contact location between the steel duct and the gypsum board.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-S SIL GG Sealant, FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP606 Flexible Firestop Sealant
   C. Steel Retaining Angles — Min No. 16 gauge galv steel angles sized to lap steel duct a min of 2 in. (51 mm) and to lap wall surfaces a min of 1 in. (25 mm). When max duct dimension does not exceed 48 in. (122 cm) and duct area does not exceed 1300 in2 (8387 cm2), angles may be min No. 18 gauge galv steel. Angles attached to steel duct on both sides of wall with min No. 10 by 1/2 in. (13 mm) long steel sheet metal screws located a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC. When max 1-1/2 in. (38 mm) thick insulation is used, steel angles are optional for those sides of duct that do not exceed the dimension specified in Table below, dependent on packing material, sealant and annular space as specified.

Max Duct Dimension	Duct Thickness	Annular Space	Packing Material	Angle (Item 3C) Required
24 in. (610 mm)	24 ga or heavier	1/2 in. min to 1 in. max (13 to 25 mm)	Item 3A1	No

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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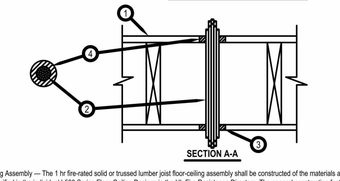
January 20, 2015

System No. F-C-3044

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 3 in. (76 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 3 in. (76 mm).
1.1 Chase Wall — (Not Shown, Optional)—The through penetrants (Item 2) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm) lumber plates. Max diam of opening shall be 3 in. (76 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm) lumber plates. Max diam of opening shall be 3 in. (76 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Cables — Aggregate cross-sectional area of cables in opening to be max 25 percent of the cross-sectional area of the opening. The annular space within the firestop system shall be 3/4 in. Cables to be rigidly supported on both sides of floor assembly. Any combination of the following types and sizes of cables may be used:
   A. RG 59 coaxial cable with single copper conductor, cellular polyethylene cellular foam insulation and polyvinyl chloride (PVC) jacket.
   B. Max 25 pair No. 24 AWG telephone cable with polyvinyl chloride (PVC) jacketing.
   C. Max 3/C No. 10 AWG cable (Type NM).
   D. Max 3/C with ground No. 2/0 AWG aluminum or copper Type SER cable with polyvinyl chloride (PVC) insulation.
   E. Max 24 fiber optic cable.
   F. Through Penetrating Products* — Three conductor No. 10 AWG Metal-Clad Cable.
   AFC CABLE SYSTEMS INC
3. Fill, Void or Cavity Materials*-Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within the annular space, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of sealant applied within annular space, flush with bottom surface of the gypsum wallboard or lower top plate. Sealant forced into the interstices of the cables on both sides of the wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.
+Bearing the UL Listing Mark

Hilti Firestop Systems

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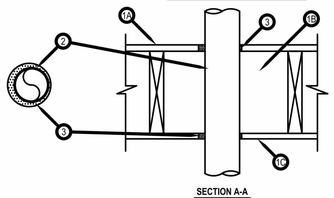
January 20, 2015

System No. F-C-7013

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 0 Hr	FT Rating — 0 Hr
	FH Rating — 1 Hr
	FTH Rating — 0 Hr



SECTION A-A

1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5-1/4 in. (133 mm).
   B. Wood Joist* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 5-1/4 in. (133 mm).
1.1 Chase Wall — (Not shown, Optional) The through penetrants (Item 2) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) lumber or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) lumber or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 5-1/4 in.
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) lumber plates or two sets of nom 2 by 4 in. (51 by 102 mm) lumber plates tightly butted. Max diam of opening is 5-1/4 in. (133 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Steel Duct — Nom 4 in. (102 mm) diam (or smaller) No. 28 gauge (or heavier) steel duct to be installed either concentrically or eccentrically within the firestop system. The annular space between duct and periphery of opening shall be min of 1/4 in. (6 mm) to max 3/4 in. (19 mm). Steel duct to be rigidly supported on both sides of floor-ceiling assembly.
3. Fill, Void or Cavity Materials*-Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within the annular space, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of sealant applied within annular space, flush with bottom surface of gypsum board or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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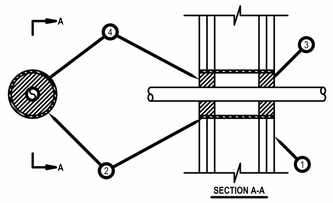
January 20, 2015

System No. W-L-2186

F Ratings — 1 and 2 Hr (See Items 1 and 4)
T Ratings — 1/2 and 1 Hr (See Items 3 and 4)
L Rating at Ambient - Less Than 1 CFM/sq ft
L Rating at 400 F - 2 CFM/sq ft



1. Wall Assembly — The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — For 1 hr assembly, one layer of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. For 2 hr assembly, two layers of min 5/8 in. (16 mm) thick gypsum board as required in the individual Wall and Partition Design. Max diam of opening is 3 in. (76 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Sleeve — (Optional) - Max 3 in. (76 mm) diam Schedule 40 (or heavier) steel pipe sleeve friction-fit into circular opening core drilled through wall. Length of steel sleeve to be equal to thickness of wall.
3. Through Penetrant — One nom 1 in. (25 mm) diam (or smaller) SDR 9 cross-linked polyethylene (PEX) tubing for use in closed (process or supply) piping systems. The tubing installed concentrically or eccentrically within the opening. The annular space between the tube and the steel sleeve or wall opening shall be min 1/2 in. (13 mm) to max 1-3/8 in. (35 mm). Tube to be rigidly supported on both sides of wall assembly. When steel sleeve (Item 2) is not provided, tube may be installed at an angle not greater than 45 degrees from perpendicular.
   The hourly T Rating is 1/2 Hr and 1 Hr for 1 Hr and 2 Hr fire rated wall assemblies, respectively.
4. Fill, Void or Cavity Material*-Sealant — Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly for 1 and 2 hr rated walls, respectively. When a steel sleeve (Item 2) is provided for assemblies with L Ratings, sealant shall be applied around periphery of opening to cover the exposed ends of the sleeve and to lap min 1/4 in. (6 mm) onto gypsum board on each side of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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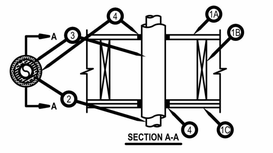
January 22, 2015

System No. F-C-5037

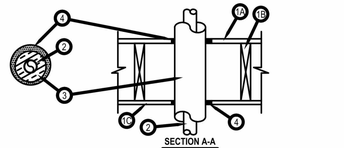
ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1/4 and 1-3/4 Hr (See Item 1)	FT Ratings — 1/4 and 1-3/4 Hr (See Item 1)
	FH Ratings — 1 and 2 Hr (See Item 1)
	FTH Ratings — 1/4 and 1-3/4 Hr (See Item 1)



1. Floor-Ceiling Assembly — The 1 and 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F and FH Rating are dependent on the hourly rating of the floor ceiling assembly. The T, FT and FTH Rating are 1/4 hr for 1 hr rated floor ceiling assemblies and 1-3/4 hr for 2 hr rated floor ceiling assemblies. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening shall be 5-1/8 in. (130 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels (Not Shown) — Resilient galv steel furring installed perpendicular to wood joists between first and second layers of wallboard (Item 1D). Furring channels spaced max 24 in. (610 mm).
   D. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. First layer of wallboard nailed to wood joists. Second layer of wallboard screw-attached to furring channels. Max diam of ceiling opening is 5-1/8 in. (130 mm).
1.1 Chase Wall — (Not Shown, Optional) The through penetrants (Item 2) may be routed through fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) lumber or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) lumber or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 5-1/8 in.
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) lumber plates or two sets of nom 2 by 4 in. (51 by 102 mm) lumber plates tightly butted. Max diam of opening is 5-1/8 in. (130 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Through Penetrants — One metallic tube or pipe to be installed within the firestop system. Tube or pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of metallic tubes or pipes may be used:
   A. Copper Tubing — Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   B. Copper Pipe — Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   C. Steel Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
3. Tube Insul

System No. F-C-5036

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 6-7/8 in. (175 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (1.2 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 6-7/8 in. (175 mm).
1.1 Chase Wall — (Not Shown, Optional) The through penetrants (Item 2) may be routed through a 1 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Bole Plate — Nom 2 by 8 in. (51 by 203 mm) lumber or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 6-7/8 in. (175 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 8 in. (51 by 203 mm) lumber plates or two sets of nom 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 6-7/8 in. (175 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
2. Through Penetrants — One metallic tube or pipe to be installed within the firestop system. Tube or pipe to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of metallic tubes or pipes may be used:
   A. Copper Tubing — Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   B. Copper Pipe — Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
   C. Steel Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
3. Pipe Covering — Nom 1-1/2 in. (38 mm) thick hollow cylindrical heavy density (min 3.5 pcf (56 kg/m3)) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing tape. Traverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space shall be min 1/2 in. (13 mm) and max 1 in. (25 mm).
   See Pipe and Equipment Covering Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. Fill, Void or Cavity Materials* - Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within annular space, flush with top surface of subfloor or sole plate. Min 5/8 in. (16 mm) thickness of sealant applied within the annular space, flush with bottom surface of gypsum wallboard or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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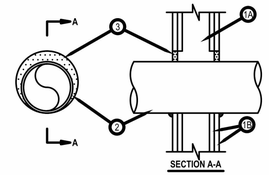
January 20, 2015

System No. W-L-1054

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings —1 and 2 Hr (See Items 1 and 3)	F Ratings — 1 and 2 Hr (See Items 1 and 3)
T Rating — 0 Hr	FT Rating — 0 Hr
L Rating at Ambient — Less Than 1 CFM/sq ft	FH Ratings —1 and 2 Hr (See Items 1 and 3)
L Rating at 400 F — Less Than 1 CFM/sq ft	FTH Rating — 0 Hr
	FTH Rating — 0 Hr
	L Rating at Ambient — Less Than 1 CFM/sq ft L Rating at 400 F — Less Than 1 CFM/sq ft



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be a nom 6 in. (152 mm) wide and 12 in. (305 mm) higher than the width and height of the steel duct.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick, 4 ft (1.22 mm) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 32-1/4 in. (819 mm) for steel stud walls. Max diam of opening is 14-1/2 in. (368 mm) for wood stud walls.
   The F and FH Ratings of the firestop system are equal to the fire rating of the wall assembly.
2. Through-Penetrants — One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space shall be min 0 in. to max 2-1/4 in. (57 mm). Pipe may be installed with continuous point contact. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. Steel Pipe — Nom 30 in. (762 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 30 in. (762 mm) diam (or smaller) cast or ductile iron pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or 6 in. (152 mm) . diam steel conduit.
   D. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) regular (or heavier) copper pipe.
3. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point or continuous contact locations between pipe and wall, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe wall interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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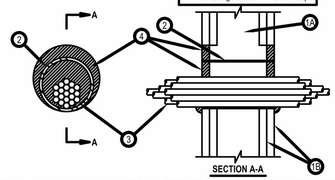
January 23, 2015

System No. W-L-3065

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 0 and 3/4 Hr (See Item 3)	FT Rating — 0 and 3/4 Hr (See Item 3)
L Rating At Ambient — 15 CFM/sq ft	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — 8 CFM/sq ft	FTH Rating — 0 and 3/4 Hr (See Item 3)
	L Rating At Ambient — 15 CFM/sq ft
	L Rating At 400 F — 8 CFM/sq ft



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum board, with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max diam of opening is 5-1/2 in. (138 mm) when sleeve (Item 2) is employed. Max diam of opening is 4 in. (102 mm) when sleeve (Item 2) is not employed.
   The F, FH Ratings of the firestop system are equal to the fire rating of the wall assembly.
2. Metallic Sleeve — (Optional) - Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or Schedule 5 (or heavier) steel pipe or min 0.016 in. thick (0.41 mm, No. 28 ga) galv steel sleeve installed flush with wall surfaces. The annular space between steel sleeve and periphery of opening shall be min 0 in. (0 mm, point contact) to max 1 in. (25mm). When Schedule 5 steel pipe or EMT is used, sleeve may extend up to 18 in. (457 mm) beyond the wall surfaces. As an option when Schedule 5 steel pipe or EMT is used, sleeve may extend continuously beyond one wall surface. When cable bundle penetrates wall assembly at an angle of 45 degrees, no metallic sleeve is used.
3. Cables — Aggregate cross-sectional area of cable in opening to be max 45 percent of the cross-sectional area of the opening. The annular space between the cable bundle and the periphery of the opening to be min 0 in. (point contact) to max 1 in. (25 mm). When sleeve is continuous on one side of wall (see Item 2), the cable fill may be 0 to 45% and the max annular space is not limited. Cables to be rigidly supported on both sides of the wall assembly. Cable bundle, using cables described below, may penetrate the wall at an angle not greater than 45 degrees. Any combination of the following types and sizes of copper conductor cables may be used:
   A. Max 7/C No. 12 AWG with polyvinyl chloride (PVC) insulation and jacket.
   B. Max 25 pair No. 24 AWG telephone cable with PVC insulation and jacket.
   B1. Max 4 pr No. 22 AWG Cat 5 or Cat 6 computer cables.
   C. Type RG/U coaxial cable with polyethylene (PE) insulation and PVC jacket having a max outside diameter of ½ in. (13 mm).
   C1. Max RG 6/U coaxial cable with fluorinated ethylene insulation and jacketing.
   D. Multiple fiber optical communication cable jacketed with PVC and having a max OD of 5/8 in. (16 mm).
   E. Through-Penetrating Products* — Max three copper conductor No. 8 AWG .Metal-Clad Cable+.
      AFC CABLE SYSTEMS INC
   F. Max 3/C (with ground)(or smaller) No. 8 AWG copper conductor cable with PVC insulation and jacketing.
   G. Max 3/4 in. (19 mm) diam copper ground cable with or without a PVC jacket.
   H. Fire Resistive Cables* - Max 1-1/4 in. (32 mm) diam single conductor or multi conductor Type MI cable. A min 1/8 in. (3 mm) separation shall be maintained between MI cables and any other types of cable.
   I. Max 4/C and ground 300 kcmil (or smaller) aluminum SER cable with PVC insulation and jacket.
   J. Through Penetrating Product* - Any cables, Metal-Clad Cable+ or Armored Cable+ currently Classified under the Through Penetrating Products category.
   K. Maximum 3/C No. 8 AWG metal-clad cable.
   L. Maximum 5/8 diam fiber-optic cable with PVC jacket.
   For cable bundle penetrating the wall assembly at an angle of 45 degrees, the T, FT, FTH Ratings are 0 hr and 3/4 hr for 1 and 2 hr wall assemblies, respectively.
   See Through Penetrating Product (XHLY) category in the Fire Resistance Directory for names of manufacturers.
4. Fill, Void or Cavity Material* — Sealant or Putty — Fill material applied within the annulus, flush with each end of the steel sleeve or wall surface. Fill material installed symmetrically on both sides of the wall. A min 5/8 in. (16 mm) thickness of sealant is required for the 1 or 2 hr F Rating . An additional 1/2 in. (13 mm) diam bead of fill material shall be applied at the interface of sleeve with gypsum board.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S, CP606, FS-One Sealants or FS-ONE MAX Intumescent Sealantor or CP618 Putty
5. Packing Material — (Optional, Not Shown) — Mineral wool forming material may be used as a backer for the fill material (Item 4). When used, it shall be firmly packed into annular space within the sleeve as a permanent form and recessed from end of sleeve to accommodate the required thickness of fill material.
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.
+Bearing the UL Listing Mark

Hilti Firestop Systems

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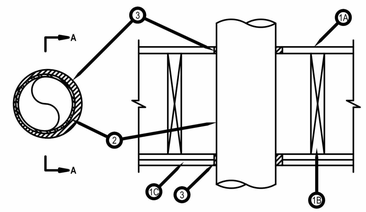
January 23, 2015

System No. F-C-1059

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr	F Rating — 1 and 2 Hr
T Rating — 1 and 2 Hr	FT Rating — 1 and 2 Hr
L Rating At Ambient — Less Than 1 CFM/sq ft	FH Rating — 1 and 2 Hr
L Rating At 400 F — 4 CFM/sq ft	FTH Rating — 1 and 2 Hr
W Rating — Class 1 (See Item 4)	L Rating At Ambient — Less Than 1 CFM/sq ft
	L Rating At 400 F — 4 CFM/sq ft



1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F, FH Rating of the firestop system is equal to the rating of the floor-ceiling and wall assemblies. The T, FT and FTH Rating of the firestop system is 0 hr for 1 hr rated floor ceiling assembly and 1/2 hr for 2 hr rated floor ceiling assembly. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor of lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 7-5/8 in. (194 mm).
   B. Wood Joists* — Nom 10 in (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening shall be 7-5/8 in. (194 mm).
   D. Furring Channels — (Not Shown) (As required) Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
1.1 Chase Wall — (Not Shown, Optional)—The through penetrants (Item 2) may be routed through a 1 or 2 hr fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features :
   A. Studs — Nom 2 by 8 in. (51 by 203 mm) lumber or double nom 2 by 6 in. (51 by 152 mm) lumber studs.
   B. Sole Plate — Nom 2 by 8 in. (51 by 203 mm) lumber or parallel 2 by 6 in. (51 by 152 mm) lumber plates, tightly butted. Max diam of opening shall be 7-5/8 in. (194 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 8 in. (51 by 203 mm) lumber plates or two sets of nom 2 by 6 in. (51 by 152 mm) lumber plates, tightly butted. Max diam of opening is 7-5/8 in. (194 mm).
   D. Gypsum Board* — Thickness, type, number or layers and fasteners shall be as specified in individual Wall and Partition Designs.
2. Through Penetrants — One metallic tubing, pipe or conduit to be installed concentrically or eccentrically within the firestop system. Annular space between pipe or conduit and edge of opening to be min 1/4 in. (6 mm) and max 3/4 in. (19 mm). Pipe, tubing or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of metallic pipes, tubing or conduit may be used:
   A. Steel Pipe — Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe.
   B. Iron Pipe — Nom 6 in. (152 mm) diam (or smaller) cast or ductile pipe.
   C. Conduit — Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing or nom 6 in. diam (or smaller) steel conduit.
   D. Steel Flexible Metal Conduit + — Nom 2 in. (51 mm) diam (or smaller) steel flexible metal conduit.
      See Flexible Metal Conduit (DXUZ) category in the Electrical Construction Materials Directory for names of manufacturers.
3. Fill, Void or Cavity Material*—Sealant — Min 5/8 in. (16 mm) or 1-1/4 in. (32 mm) thickness of sealant applied within annulus, flush with both surfaces of gypsum wallboard or lower top plate for 1 and 2 hr floors respectively. Min. 3/4 in. (19 mm) thickness of sealant applied within annular space, flush with top surface of floor or sole plate.
   HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant
+Bearing the UL Listing Mark.
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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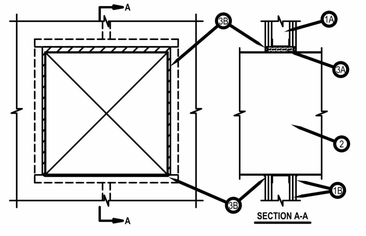
January 15, 2015

Notes:

1. *Refer to section 15084 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.*
2. *Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:*
   * *Minimum and maximum Width of Joints*
   * *Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.*
3. *If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Drawings shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.*
4. *References:*
   * *2013 Underwriter's Laboratories Fire Resistance Directory, Volume 2*
   * *NFPA 101 Life Safety Code*
   * *All governing local and regional building codes*
5. *Firestop System installation must meet requirements of ASTM E-814 (UL 1479) tested assemblies that provide a fire rating equal to that of construction being penetrated.*
6. *All rated through-penetrations shall be prominently labeled with the following information:*
   * *ATTENTION: Fire Rated Assembly*
   * *UL System #*
   * *Product(s) used*
   * *Hourly Rating (F-Rating)*
   * *Installation Date*

System No. W-L-7143

F Ratings — 1 and 2 Hr (See Items 1 and 2)
T Ratings — 0 and 1/2 Hr (See Item 1)



1. Wall Assembly — The 1 and 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of min. 3-1/2 in. (89 mm) wide steel channel studs and spaced max 24 in. (610 mm) OC. Additional 3-1/2 in. (89 mm) wide steel studs shall be used to completely frame opening.
   B. Gypsum Board — One or two layers of 5/8 in. (16 mm) thick gypsum board as specified in the individual Wall and Partition Design. Max size of opening is 625 sq in. (4032 cm2) with a max dimension of 25 in. (635 mm).
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T Rating of the firestop system is 1/2 hr for 2 hr fire rated walls and 0 hr for 1 hr fire rated walls.
2. Steel Duct — Nom. 24 in. by 24 in. (610 by 610 mm) (or smaller) No. 24 gauge (or heavier) galv. steel duct to be installed within the firestop system. An annular space of min 1/2 in. (13 mm) to max 1 in. (25 mm) is required within the firestop system. As an option, for systems with a 2 hr F Rating only, the min annular space may be 0 in. (point contact). Steel duct to be rigidly supported on both sides of wall assembly.
3. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — Min 3-3/4 in. (95 mm) or 5 in. (127 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation firmly packed into opening as a permanent form for 1 and 2 hr rated assemblies, respectively. Packing material to be recessed from both surfaces of wall to accommodate the required thickness of fill material.
   B. Fill Void or Cavity Materials* - Sealant — Min 1/2 in. (13 mm) thickness of sealant applied within annulus, flush with both surfaces of wall assembly. Min 1/4 in. (6 mm) diam bead of sealant shall be applied at the duct/gypsum board interface at any point contact location, on both surfaces of wall assembly.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 606 Sealant

*Bearing the UL Classification Mark

Hilti Firestop Systems

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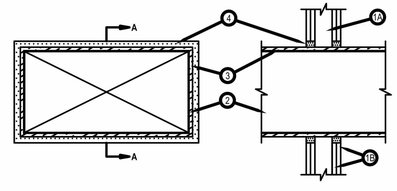
October 12, 2012

System No. W-L-7059

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Item 1)	F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 1/2 and 3/4 Hr (See Item 1)	FT Rating - 1/2 and 3/4 Hr(See Item 1)
	FH Ratings - 1 and 2 Hr (See Item 1)
	FTH Rating - 1/2 and 3/4 Hr (See Item 1)



1. Wall Assembly — The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of channel studs. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC. The opening in the wall to accommodate the steel duct (Item 2) shall be framed on all sides using lengths of studs installed between the vertical studs and attached to the studs at each end. The framed opening in the wall shall be a nom 6 in. (152 mm) wide and 12 in. (305 mm) higher than the width and height of the steel duct.
   B. Wallboard, Gypsum* — 5/8 in. (16 mm) thick, 4 ft (1.22 mm) wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400, V400 or W400 Series Design in the UL Fire Resistance Directory. Max area of opening is 395 sq. in. (0.25 m2)with max dimensions of 26-3/4 in. (679 mm) for steel studs. The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed. The hourly T, FT and FTH Ratings are 1/2 hr and 3/4 hr for 1 and 2 hr rated assemblies, respectively
2. Steel Duct — Nom 24 in. by 12 in. (610 by 305 mm) (or smaller) No. 24 gauge (or heavier) steel duct to be installed eccentrically within the framed opening. The annular space shall be min 1 in. (25 mm) to max 1-3/4 in. (45 mm) Steel duct to be rigidly supported on both sides of wall assembly.
3. Batts and Blankets* — Max 1-1/2 in. (38 mm) thick glass fiber batt or blanket (min 3/4 pcf or 12 kg/m3) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed 50% such that the annular space within the firestop system shall be min 1/4 in. (6 mm) to max 1 in. (25 mm).
   See Batts and Blankets - (BKNV) category in the Building Materials Directory for names of manufactures. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.
4. Fill, Void or Cavity Material* - Sealant — Min 5/8 in. or 1-1/4 in. (16 or 32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall for 1 or 2 hr walls, respectively. If voids develop after the fill materials cures, the voids shall be sealed with additional fill material.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

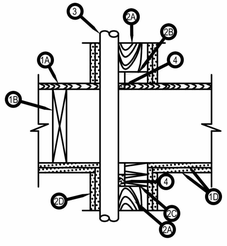
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

Reproduced by HILTI, Inc. Courtesy of Underwriters Laboratories, Inc.
January 27, 2015

System No. F-C-2081

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 2 Hr (See Item 1)



1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F and T Ratings of the firestop system is equal to the rating of the floor-ceiling and wall assemblies. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor or lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
   B. Wood Joists* — For 1 hr fire-rated floor-ceiling assemblies nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254 mm) lumber joists spaced 16 in. (406 mm) OC with nom 1 by 3 in. (25 by 76 mm) lumber bridging and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
2. Chase Wall — (Optional) - The 1 or 2 hr fire-rated single wood stud/gypsum wallboard chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm) lumber plates. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm) lumber plates. Diam of opening shall be 1/2 in. (13 mm) larger than the nom diam of through-penetrant (Item 3).
   D. Gypsum Board — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Through-Penetrants — One nom 1 in. (25 mm) diam crosslinked polyethylene (PEX) SDR 9 tube for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Diam of opening through flooring system and through sole and top plates of chase wall to be max 1-1/2 in. (38 mm). Pipe to be rigidly supported on both sides of floor-ceiling assembly.
4. Fill, Void or Cavity Material* — Sealant — Min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate and a min 1/2 in. (13 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the ceiling or lower top plates.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant.

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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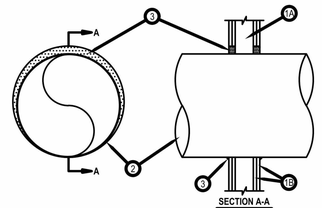
January 20, 2015

System No. W-L-7042

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings - 1 and 2 Hr (See Items 1 and 3)	F Ratings - 1 and 2 Hr (See Items 1 and 3)
T Rating - 0 Hr	FT Rating - 0 Hr
	FH Ratings - 1 and 2 Hr (See Items 1 and 3)
	FTH Rating - 0 Hr



1. Wall Assembly — The 1 or 2 hr fire rated wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features.
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced 24 in. (610 mm) OC..
   B. Gypsum Board* — For 1 hr assembly, one layer of min 5/8 in. (16 mm) thick wallboard as required in the individual Wall and Partition Design. For 2 hr assembly, two layers of min 5/8 in. (16 mm) thick wallboard as required in the individual Wall and Partition Design. Max diam of opening is 14-1/2 in. (368 mm) for wood stud walls and 21-3/4 in. (552 mm) for steel stud walls.
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrant — Galv steel duct to be installed concentrically or eccentrically within the firestop system. The annular space between the duct and periphery of opening shall be 0 in. (0 mm, point contact) and max 1-1/2 in. (64 mm) Duct to be rigidly supported on both sides of wall assembly.
   A. Spiral Wound HVAC Duct — Nom 20 in. (502 mm) diam (or smaller) No. 24 MSG (or heavier) galv steel spiral wound duct.
   B. Sheet Metal Duct — Nom 12 in. (305 mm) diam (or smaller) No. 28 MSG (or heavier) galv sheet steel duct.
3. Fill, Void or Cavity Material*—Sealant — Min 5/8 in. (16 mm) and 1-1/4 in. (32 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly for 1 or 2 hr rated walls, respectively. At the point contact location between duct and wallboard, a min 1/2 in. (13 mm) diam bead of sealant shall be applied at the wallboard/duct interface on both surfaces of wall assembly.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S Elastomeric Firestop Sealant, FS-ONE Sealant, FS-ONE MAX Intumescent Sealant or CP606 Flexible Firestop Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

Hilti Firestop Systems

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January 27, 2015

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT
ROBERT R. WRIGHT
NO. C-32283
RENEWAL DATE 06/30/2025
STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

TYPICAL FIRESTOP DETAILS

SCALE 12" = 1'-0"

A-808

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

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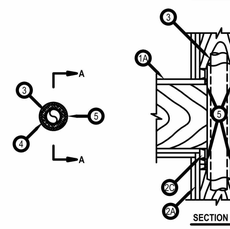
24" X 36"

System No. F-C-5004

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating — 1 and 1-3/4 Hr (See Item 1)	FT Rating — 1 and 1-3/4 Hr (See Item 1)
L Rating At Ambient — 4 CFM/Sq Ft (See Item 4)	FH Rating — 1 and 2 Hr (See Item 1)
L Rating At 400 F — Less Than 1 CFM/Sq Ft (See Item 4)	FTH Rating — 1 and 1-3/4 Hr (See Item 1)
	L Rating At Ambient — 4 CFM/Sq Ft (See Item 4)
	L Rating At 400 F — Less Than 1 CFM/Sq Ft (See Item 4)



1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F Rating of the firestop system is equal to the rating of the floor-ceiling assembly. The T Rating is 1 and 1-3/4 hr for 1 and 2 hr rated assemblies, respectively. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor or lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3-1/2 in. (89 mm).
   B. Wood Joists* — Nom 10 in (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3-1/2 in. (89 mm).
2. Chase Wall — (Optional) - The through penetrant (Item 3) may be routed through a fire-rated single, double or staggered wood stud/gypsum wallboard chase wall having a fire rating consistent with that of the floor-ceiling assembly. The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening shall be 3-1/2 in. (89 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 6 in. (51 by 152 mm) or two sets of parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 3-1/2 in. (89 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Wall and Partition Design.
3. Through Penetrants — One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Copper Tubing — Nom 2 in. (51 mm) diam (or smaller) Type L (or heavier) copper tubing.
   C. Copper Pipe — Nom 2 in. (51 mm) diam (or smaller) Regular (or heavier) copper pipe.
4. Pipe Covering* — Nom 1/2 in. (13 mm) thick hollow cylindrical heavy density (min 3.5 pcf (56 kg/m3)) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. A nom annular space of 1/8 in. (3 mm) is required within the firestop system.
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4A. Tube Insulation — Plastics+ — Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (ABIPVC) flexible foam furnished in the form of tubing. An annular space of min 1/8 in. (3 mm) to max 3/8 in. (10 mm) is required within the firestop system.
   See Plastics+ (QMFZ2) category in the Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.
   (Note: L Ratings apply only when glass fiber insulation is used.)
5. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate. Min 5/8 in. (16 mm) thickness of fill material also applied within the annulus, flush with bottom surface of ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-CNE MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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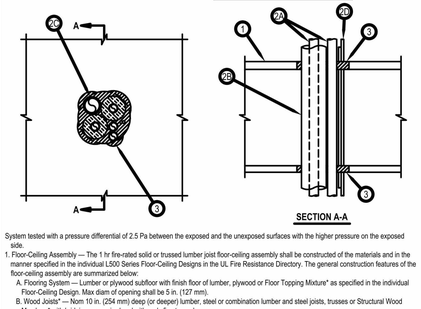
January 20, 2015

System No. F-C-8026

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 Hr	F Rating — 1 Hr
T Rating — 1 Hr	FT Rating — 1 Hr
	FH Rating — 1 Hr
	FTH Rating — 1 Hr



System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.
1. Floor-Ceiling Assembly — The 1 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The general construction features of the floor-ceiling assembly are summarized below:
   A. Flooring System — Lumber or plywood subfloor with finish floor or lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of opening is 5 in. (127 mm).
   B. Wood Joists* — Nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped.
   C. Gypsum Board* — Nom 4 ft (122 m) wide by 5/8 in. (16 mm) thick as specified in the individual Floor-Ceiling Design. Gypsum board secured to wood joists or furring channels as specified in the individual Floor-Ceiling Design.
1A. Chase Wall — (Optional, Not Shown) - The through penetrants (Item 2) may be routed through a 1 hr fire rated single, double or staggered wood stud/gypsum board chase wall. Depth of chase wall stud cavity to be min 1/2 in. (13 mm) greater than diameter of opening cut in sole and top plates to accommodate the through penetrant (Item 2). The chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or double nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm), 2 by 6 in. (51 by 152 mm) or parallel 2 by 4 in. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5 in. (127 mm).
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm), two nom 2 by 6 in., (51 by 102 mm) or two sets of parallel 2 by 4 in.. (51 by 102 mm) lumber plates, tightly butted. Max diam of opening is 5 in. (127 mm).
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Wall and Partition Design.
2. Through-Penetrants — One or more pipes, conduits, tubing and cables to be installed concentrically or eccentrically within the opening. The space between any penetrant, except nonmetallic pipes and uninsulated metallic pipes to be min 0 in. (point contact) to max 1 in. (25 mm). The space between any penetrants and the periphery of the opening shall be min 0 in. (point contact) to max 1 in. (25 mm). Pipes, conduits, tubing and cables to be rigidly supported on both sides of floor-ceiling assembly.
   A. Metallic Penetrants — One or more metallic pipes, conduits or tubing to be installed within the firestop system. The following types and sizes of metallic pipes, conduits or tubing may be used:
      A1. Steel Pipe — Nom 3/4 in. (19 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
      A2. Conduit — Nom 3/4 in. (19 mm) diam (or smaller) steel electrical metallic tubing (EMT) or 3/4 in. (19 mm) diam galv steel conduit.
      A3. Copper Tube — Nom 3/4 in. (19 mm) diam (or smaller) Type L (or heavier) copper tube.
      A4. Copper Pipe — Nom 3/4 in. (19 mm) diam (or smaller) Regular (or heavier) copper pipe.
   B. Tube Insulation - Plastics+ — Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. Tube insulation to be installed on one or more of the metallic pipes or tubes (Item 2A).
      See Plastics+ (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.
   C. Nonmetallic Through Penetrants — One nonmetallic pipe to be installed within the firestop system. Pipe shall be spaced a min 1-1/2 in. (38 mm) from non-uninsulated metallic through penetrants. The following types and sizes of metallic pipes may be used:
      C1. Polyvinyl Chloride (PVC) Pipe — Nom 1-1/4 in. (32 mm) diam (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping system.
      C2. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 1-1/4 in. (32 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   D. Cables — Max of two 4 pair No. 18 AWG (or smaller) cable with PVC insulation and jacket materials.
3. Fill, Void or Cavity Materials* - Sealant — Min 3/4 in. (19 mm) thickness of sealant applied within the annulus flush with the top surface of the floor or sole plate and min 5/8 in. (16 mm) thickness of sealant applied within the annulus flush with the bottom surface of gypsum board or top plate. A min ¼ in. (6 mm) diameter bead of sealant applied at the bundle/subflooring or sole plate interface and the bundle/gypsum board or top plate interface at point contact locations.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE_MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

+Bearing the UL Recognized Component Mark

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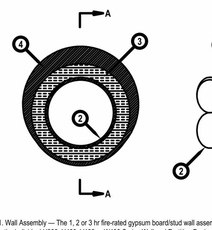
January 21, 2015

System No. W-L-5029

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)	F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4)
T Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)	FT Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
L Rating At Ambient — 4 CFM/Sq Ft	FH Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 4)
L Rating At 400 F — Less Than 1 CFM/Sq Ft	FTH Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3)
	L Rating At Ambient — 4 CFM/Sq Ft
	L Rating At 400 F — Less Than 1 CFM/Sq Ft



1. Wall Assembly — The 1, 2 or 3 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide for 1 and 2 hr F and FH rating and 3-1/2 in. (89 mm) wide for 3 hr F and FH rating and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Min 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 18-5/8 in. (473 mm).
   The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
   A. Steel Pipe — Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. Iron Pipe — Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper tube shall not exceed 4 in. (102 mm).
   D. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).
3. Pipe Covering* — Nom 1, 1-1/2 or 2 in. (25, 38 or 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m³) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1-1/4 in. (32 mm).
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Material Directory for the names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   The hourly T, FT, FH and FTH Ratings of the firestop system are 1/2 hr for 1 hr rated walls and 1 hr for 2 hr rated walls. For 3 hr rated walls, the hourly T, FT and FTH Ratings when steel and iron pipes are used are 1 hr. For 3 hr rated walls, the hourly T, FT and FTH Ratings when copper penetrants are used are 1-1/4 hr for 2 in. (51 mm) thick pipe covering and 0 hr for pipe covering thickness less than 2 in. (51 mm).
3A. Pipe Covering* — (Not Shown) — As an alternate to Item 3, max 2 in. (51 mm) thick cylindrical calcium silicate (min 14 pcf) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. When the alternate pipe covering is used, the T and FT Rating shall be as specified in item 3 above.
   See Pipe and Equipment Covering — Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. Fill, Void or Cavity Material* — Sealant — For 1 and 2 hr F and FH Rating, min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. For 3 hr F and FH Rating, min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and gypsum board, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe covering/gypsum board interface on both surfaces of wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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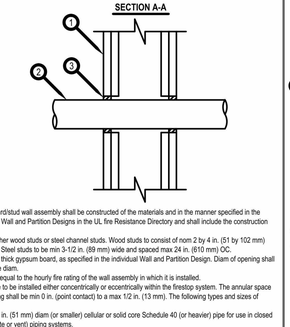
March 19, 2015

System No. W-L-2474

F Ratings - 1 and 2 Hr (See Item 1)
T Rating - 0 Hr
L Rating At Ambient - Less Than 1 CFM/Sq Ft
L Rating at 400 F - 4 CFM/Sq Ft



1. Wall Assembly — The fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the construction features noted below:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum board, as specified in the individual Wall and Partition Design. Diam of opening shall be 1 in. (25 mm) larger than the nom pipe diam.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants — One nonmetallic pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe and the periphery of the opening shall be min 0 in. (point contact) to a max 1/2 in. (13 mm). The following types and sizes of nonmetallic pipes may be used:
   A. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) cellular or solid core Schedule 40 (or heavier) pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. Crosslinked Polyethylene (PEX) Tubing — Nom 2 in. (51 mm) diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems.
   D. Rigid Nonmetallic Conduit (RNC)+ — Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA No. 70).
3. Fill, Void or Cavity Material* - Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At point contact location, a min 5/8 in. (16 mm) diam bead of fill material shall be applied to the wall/penetrant interface on both surfaces of the wall.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

+ Bearing the UL Listing Mark

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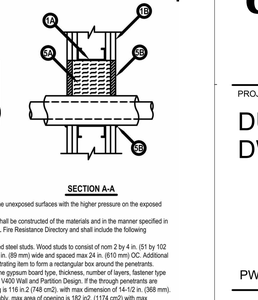
January 26, 2015

System No. W-L-8065

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating — 1 and 2 Hr (See Item 1)	F Rating — 1 and 2 Hr (See Item 1)
T Rating —0 Hr	FT Rating — 0 Hr
	FH Rating — 1 and 2 Hr (See Item 1)
	FTH Rating — 0 Hr



System tested with a pressure differential of 2.5 Pa between the exposed and the unexposed surfaces with the higher pressure on the exposed side.
1. Wall Assembly — The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be installed in stud cavity containing through-penetrating item to form a rectangular box around the penetrants.
   B. Gypsum Board* — 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300, U400 or V400 Wall and Partition Design. If the through penetrants are installed in a wood stud/gypsum board assembly, the max area of opening is 116 in 2 (748 cm2), with max dimension of 14-1/2 in. (368 mm). If the through penetrants are installed in a steel stud/gypsum board assembly, max area of opening is 182 in2. (1174 cm2) with max dimension of 22-3/4 in. (578 mm) wide.
   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through-Penetrant — One or more pipes, conduit or tubes to be installed within the opening. The total number of through-penetrants is dependent on the size of the opening and the types and sizes of the penetrants. Any combination of the penetrants described below may be used provided that the following criteria parameters relative to the annular spaces and the spacing between the through penetrants are maintained. The separation between the penetrants shall be min 1 in. (25 mm) to max 22 in. (560 mm). The annular space between penetrants and the periphery of opening shall be min 0 in. (0 mm, point contact) to max 22 in. (560 mm). Pipes, conduit or tubes to be rigidly supported on both sides of wall assembly. The following types and sizes of pipes, conduit or tubes may be used:
   A. Copper Tubing — Nom 3 in. (76 mm) diam (or smaller) Type L (or heavier) copper tube.
   B. Copper Pipe — Nom 3 in. (76 mm) diam (or smaller) Regular (or heavier) copper pipe.
   C. Steel Pipe — Nom 3 in. (76 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   D. Iron Pipe — Nom 3 in. (76 mm) diam (or smaller) cast or ductile iron pipe.
   E. Conduit — Nom 3 in. (76 mm) diam (or smaller) electric metallic tubing (EMT) or rigid steel conduit.
   F. Polyvinyl Chloride (PVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems.
   G. Chlorinated Polyvinyl Chloride (CPVC) Pipe — Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems.
   H. Rigid Nonmetallic Conduit (RNC)+ — Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Articles 347 and 710 of the National Electrical Code (NFPA No. 70).
   I. Cross Linked Polyethylene Tubing — Nom 1 in. (25 mm) diam (or smaller) cross-linked polyethylene tubing for use in closed (process or supply) piping systems.
3. Pipe Insulation — One or more metallic penetrants (pipe or tubing) may be insulated with the following types of pipe coverings:
   A. Pipe Covering* — Nom 1 in. (25 mm) to max 2 in. (51 mm) thick hollow cylindrical heavy density min 3.5 pcf (56 kg/m³) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.
      See Pipe and Equipment Covering - Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   B. Tube Insulation-Plastics+ — Nom 1/2 in. (13 mm) to max 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing.
      See Plastics+ (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.
   C. Pipe Covering Materials — Min 1 in. (25 mm) to max 2 in. (51 mm) thick unfaced mineral fiber pipe insulation having a nom density of 3.5 pcf (56 kg/m³) or heavier and sized to fit the outside diam of pipe or tube. Pipe insulation secured with min 18 SWG steel wire spaced 12 in. (305 mm) OC.
      IG MINWOOL L L C — High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT and High Temperature Pipe Insulation Thermaloc
   C1. Sheathing Material — (Not shown) — Optional, used in conjunction with Item 3C. Foil-scrim-kraft or all service jacket material shall be wrapped around the outer circumference of the pipe covering material (Item 3B) with the kraft side exposed. Longitudinal joints sealed with metal fasteners.
      See Sheathing Materials (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread value of 25 or less and a Smoke Developed value of 50 or less may be used.
      The annular space between the insulated penetrants and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 5 in. (127 mm). The separation between the insulated penetrants and the other penetrants shall be a min 1 in. (25 mm) to max 22 in. (560 mm).
4. Cables — One or more 3 in. (76 mm) diam bundle of cables installed within the opening and rigidly supported on both sides of wall. The annular space between the tightly-bundled cables and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 5 in. (127 mm). The separation between the cable bundle and the other penetrants shall be min 1 in. (25 mm) to max 22 in. (560 mm). Any combination of the following types and sizes of cables may be used:
   A. Max 25 pair No. 24 AWG telephone cable with polyvinyl chloride (PVC) insulation and jacket.
   B. Max 7/C No. 12 AWG copper conductor power and control cable with PVC or cross-linked polyethylene (XLPE) insulation and PVC jacket.
   C. Multiple fiber optical communication cable jacketed with PVC and having a max outside diam of 1/2 in. (13 mm).
   D. Max 3/C No. 8 AWG with bare aluminum ground, PVC insulated steel Metal-Clad+ Cable currently Classified under the Through Penetrating Product* (XHLY) category.
   E. Max 3/C (with ground) No. 12 AWG (or smaller) nonmetallic sheathed (Romex) cable with PVC insulation and jacket materials.
   F. RG/U coaxial cable with polyethylene (PE) insulation and polyvinyl chloride (PVC) jacket having a max outside diam of 1/2 in. (13 mm).
5. Firestop System — The firestop system shall consist of the following:
   A. Packing Material — In 2 hr fire rated wall assemblies, min 4-3/4 in. (121 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. In 1 hr fire rated wall assemblies, min 3-1/2 in. (89 mm) thickness of min 4 pcf (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material recessed from both surfaces of the wall to accommodate the required thickness of fill material.
   B. Fill, Void or Cavity Material* — Sealant — Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At the point contact location between through penetrants and gypsum board, a min 1/4 in. (6 mm) diam bead of fill material shall be applied at the gypsum board/through penetrant interface on both surfaces of wall.
      HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

+ Bearing the UL Listing Mark

Bearing the UL Recognized Component Mark

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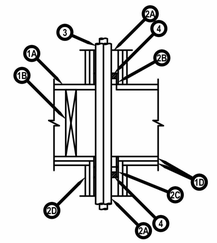
January 28, 2015

System No. F-C-2310

F Ratings — 1 and 2 Hr (See Item 1)
T Ratings — 1 and 1-1/2 Hr (See Item 1)



1. Floor-Ceiling Assembly — The 1 or 2 hr fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory. The F Rating of the firestop system is equal to the rating of the floor-ceiling and wall assemblies. The T Rating of the firestop system is 1 hr for 1 hr rated floor-ceiling and wall assemblies and 1-1/2 hr for 2 hr rated floor-ceiling and wall assemblies. The general construction features of the floor-ceiling assembly are summarized below:
   A. Forming Material — Lumber or plywood subfloor with finish floor or lumber, plywood or Floor Topping Mixture* as specified in the individual Floor-Ceiling Design. Max diam of floor opening is 3 in. (76 mm).
   B. Wood Joists* — For 1 hr fire-rated floor-ceiling assemblies nom 10 in. (254 mm) deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members* with bridging as required and with ends firestopped. For 2 hr fire-rated floor-ceiling assemblies, nom 2 by 10 in. (51 by 254 mm) lumber joists spaced 16 in. OC with nom 1 by 3 in. (25 by 76 mm) lumber bridging and with ends firestopped.
   C. Furring Channels — (Not Shown) — (As required) - Resilient galvanized steel furring installed in accordance with the manner specified in the individual L500 Series Designs in the Fire Resistance Directory.
   D. Gypsum Board* — Thickness, type, number of layers and fasteners shall be as specified in the individual Floor-Ceiling Design. Max diam of opening is 3 in. (76 mm).
2. Chase Wall — (Optional) - The 1 or 2 hr fire-rated single wood stud/gypsum wallboard chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Nom 2 by 4 in. (51 by 102 mm) lumber studs.
   B. Sole Plate — Nom 2 by 4 in. (51 by 102 mm) lumber plates.
   C. Top Plate — The double top plate shall consist of two nom 2 by 4 in. (51 by 102 mm) lumber plates. Max diam of opening is 3 in. (76 mm).
   D. Gypsum Board — Thickness, type, number of layers and fasteners shall be as specified in individual Wall and Partition Design.
3. Through-Penetrants — Nom 1 in. (25 mm) diam (or smaller) SDR 9 (or heavier) cross-linked polyethylene (PEX) tubing for use in closed (process or supply) piping systems. A max of three tubes may be installed in the opening. The annular space between the tubing and the periphery of the opening shall be a min of 3/16 in. (5 mm) to a max of 1 in. (25 mm). The space between the tubes shall be a min of 0 in. (point contact) to a max of 1/4 in. (6 mm). Tubing to be rigidly supported on both sides of the floor-ceiling assembly.
4. Fill, Void or Cavity Material* — Sealant — Min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with top surface of floor or sole plate and a min 3/4 in. (19 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the lower top plate. Min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with the bottom surface of the ceiling or lower top plate.
   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-ONE Sealant or FS-ONE-MAX Intumescent Sealant
* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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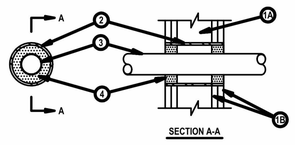
January 15, 2015

System No. W-L-2075

F Ratings - 1 & 2 Hr (See Item 4)
T Ratings - 0 and 2 Hr (see Item 4)
L Rating At Ambient - Less Than 1 CFM/Sq Ft
L Rating At 400 F - 4 CFM/Sq Ft



1. Floor or Wall Assembly — The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 OC. Steel studs to be min 2-1/2 in. (64 mm) wide and spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — Nom 5/8 in. (16 mm) thick gypsum wallboard, as specified in the individual Wall and Partition Design. Max diam of opening is 4 in. (102 mm).
2. Metallic Sleeve — (Optional) — Nom 4 in. (102 mm) diam (or smaller) Schedule 40 (or thinner) steel pipe cast into wall assembly with joint compound and installed flush with wall surfaces.
3. Electrical Nonmetallic Tubing+ — Nom 2 in. (51 mm) diam (or smaller) corrugated wall electrical nonmetallic tubing (ENT) constructed of polyvinyl chloride (PVC). Tubing to be rigidly supported on both sides of wall assembly. A nom annular space of 3/4 in. (19 mm) is required within the firestop system.
   See Electrical Nonmetallic Tubing (FKHU) category in the Electrical Construction Materials Directory for names of manufacturers.
4. Fill, Void or Cavity Material* — Sealant — Installed symmetrically on both sides of the wall. The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. Fill material applied within the annulus, flush with each end of the steel sleeve at the thickness shown in the table below:

F Rating Hr	T Rating Hr	Fill Mtl Depth In. (mm)
1	0	5/8 (16)
2	2	1-1/4 (32)

   HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — FS-One Sealant or FS-ONE MAX Intumescent Sealant

+Bearing the UL Listing Mark
*Bearing the UL Classification Marking

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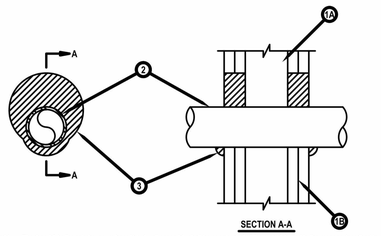
January 26, 2015

System No. W-L-2377

F Ratings - 1 and 2 Hr (See Items 1 and 3)
T Ratings - 1 and 2 Hr (See Items 1 and 3)
L - Rating at Ambient - Less Than 1 CFM/Sq Ft
L - Rating at 400°F - 4 CFM/Sq Ft



1. Wall Assembly — The 1 and 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300, U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   A. Studs — Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.
   B. Gypsum Board* — The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 3 in. (76

2022 CALIFORNIA GREEN BUILDING STANDARDS CODE

RESIDENTIAL MANDATORY MEASURES, SHEET 1 (January 2023)

Chapter 3 – Additions and Alterations

CHAPTER 3
GREEN BUILDING
SECTION 301 GENERAL

301.1 SCOPE. Buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code, but are not required unless adopted by a city, county, or city and county as specified in Section 101.7.CC
301.1.1 Additions and alterations. [HCD] The mandatory provisions of Chapter 4 shall be applied to additions or alterations of existing residential buildings where the addition or alteration increases the building's conditioned area, volume, or size. The requirements shall apply only to and/or within the specific area of the addition or alteration.

The mandatory provision of Section 4.106.4.2 may apply to additions or alterations of existing parking facilities or the addition of new parking facilities serving existing multifamily buildings. See Section 4.106.4.3 for application.

E-015,I8;
Note: Repairs including, but not limited to, resurfacing, restriping and repairing or maintaining existing lighting fixtures are not considered alterations for the purpose of this section.

Note: On and after January 1, 2014, residential buildings undergoing permitted alterations, additions, or improvements shall replace noncompliant plumbing fixtures with water-conserving plumbing fixtures. Plumbing fixture replacement is required prior to issuance of a certificate of final completion, certificate of occupancy or final permit approval by the local building department. See Civil Code Section 1101.1, et seq., for the definition of a noncompliant plumbing fixture, types of residential buildings affected and other important enactment dates.

301.2 LOW-RISE AND HIGH-RISE RESIDENTIAL BUILDINGS. [HCD] The provisions of individual sections of CALGreen may apply to either low-rise residential buildings high-rise residential buildings, or both. Individual sections will be designated by banners to indicate where the section applies specifically to low-rise only (LR) or high-rise only (HR). When the section applies to both low-rise and high-rise buildings, no banner will be used.

SECTION 302 MIXED OCCUPANCY BUILDINGS

302.1 MIXED OCCUPANCY BUILDINGS. In mixed occupancy buildings, each portion of a building shall comply with the specific green building measures applicable to each specific occupancy.

Exceptions:
1. [HCD] Accessory structures and accessory occupancies serving residential buildings shall comply with Chapter 4 and Appendix A4, as applicable.
2. [HCD] For purposes of *CAL*Green, live/work units, complying with Section 419 of the *California Building Code,* shall not be considered mixed occupancies. Live/Work units shall comply with Chapter 4 and Appendix A4, as applicable.

DIVISION 4.1 PLANNING AND DESIGN

ABBREVIATION DEFINITIONS:

HCD	Department of Housing and Community Development
BSC	California Building Standards Commission
DSA-SS	Division of the State Architect, Structural Safety
OSHPD	Office of Statewide Health Planning and Development
LR	Low Rise
HR	High Rise
AA	Additions and Alterations
N	New

CHAPTER 4
RESIDENTIAL MANDATORY MEASURES

SECTION 4.102 DEFINITIONS
4.102.1 DEFINITIONS
The following terms are defined in Chapter 2 *(and are included here for reference)*

FRENCH DRAIN. A trench, hole or other depressed area loosely filled with rock, gravel, fragments of brick or similar pervious material used to collect or channel drainage or runoff water.

WATTLES. Wattles are used to reduce sediment in runoff. Wattles are often constructed of natural plant materials such as hay, straw or similar material shaped in the form of tubes and placed on a downflow slope. Wattles are also used for perimeter and inlet controls.

4.106 SITE DEVELOPMENT
4.106.1 GENERAL. Preservation and use of available natural resources shall be accomplished through evaluation and careful planning to minimize negative effects on the site and adjacent areas. Preservation of slopes, management of storm water drainage and erosion controls shall comply with this section.

4.106.2 STORM WATER DRAINAGE AND RETENTION DURING CONSTRUCTION. Projects which disturb less than one acre of soil and are not part of a larger common plan of development which in total disturbs one acre or more, shall manage storm water drainage during construction. In order to manage storm water drainage during construction, one or more of the following measures shall be implemented to prevent flooding of adjacent property, prevent erosion and retain soil runoff on the site.

1. Retention basins of sufficient size shall be utilized to retain storm water on the site.
2. Where storm water is conveyed to a public drainage system, collection point, gutter or similar disposal method, water shall be filtered by use of a barrier system, wattle or other method approved by the enforcing agency.
3. Compliance with a lawfully enacted storm water management ordinance.

Note: Refer to the State Water Resources Control Board for projects which disturb one acre or more of soil, or are part of a larger common plan of development which in total disturbs one acre or more of soil. (Website: https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html)

4.106.3 GRADING AND PAVING. Construction plans shall indicate how the site grading or drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales
2. Water collection and disposal systems
3. French drains
4. Water retention gardens
5. Other water measures which keep surface water away from buildings and aid in groundwater recharge.

Exception: Additions and alterations not altering the drainage path.

4.106.4 Electric vehicle (EV) charging for new construction. New construction shall comply with Sections 4.106.4.1 or 4.106.4.2 to facilitate future installation and use of EV chargers. Electric vehicle supply equipment (EVSE) shall be installed in accordance with the *California Electrical Code,* Article 625.

Exceptions:
1. On a case-by-case basis, where the local enforcing agency has determined EV charging and infrastructure are not feasible based upon one or more of the following conditions:
   1.1 Where there is no local utility power supply or the local utility is unable to supply adequate power.
   1.2 Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 4.106.4, may adversely impact the construction cost of the project.
2. Accessory Dwelling Units (ADU) and Junior Accessory Dwelling Units (JADU) without additional parking facilities.

4.106.4.1 New one- and two-family dwellings and townhouses with attached private garages. For each dwelling unit, install a listed raceway to accommodate a dedicated 208/240-volt branch circuit. The raceway shall not be less than trade size 1 (nominal 1-inch inside diameter). The raceway shall originate at the main service or subpanel and shall terminate into a listed cabinet, box or other enclosure in close proximity to the proposed location of an EV charger. Raceways are required to be continuous at enclosed, inaccessible or concealed areas and spaces. The service panel and/or subpanel shall provide capacity to install a 40-ampere 208/240-volt minimum dedicated branch circuit and space(s) reserved to permit installation of a branch circuit overcurrent protective device.

Exemption: A raceway is not required if a minimum 40-ampere 208/240-volt dedicated EV branch circuit is installed in close proximity to the proposed location of an EV charger at the time of original construction in accordance with the *California Electrical Code.*

4.106.4.1.1 Identification. The service panel or subpanel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging as "EV CAPABLE". The raceway termination location shall be permanently and visibly marked as "EV CAPABLE".

4.106.4.2 New multifamily dwellings, hotels and motels and new residential parking facilities.
When parking is provided, parking spaces for new multifamily dwellings, hotels and motels shall meet the requirements of Sections 4.106.4.2.1 and 4.106.4.2.2. Calculations for spaces shall be rounded up to the nearest whole number. A parking space served by electric vehicle supply equipment or designed as a future EV charging space shall count as at least one standard automobile parking space only for the purpose of complying with any applicable minimum parking space requirements established by a local jurisdiction. See Vehicle Code Section 22511.2 for further details.

4.106.4.2.1Multifamily development projects with less than 20 dwelling units; and hotels and motels with less than 20 sleeping units or guest rooms.
The number of dwelling units, sleeping units or guest rooms shall be based on all buildings on a project site subject to this section.

1.EV Capable. Ten (10) percent of the total number of parking spaces on a building site, provided for all types of parking facilities, shall be electric vehicle charging spaces (EV spaces) capable of supporting future Level 2 EVSE. Electrical load calculations shall demonstrate that the electrical panel service capacity and electrical system, including any on-site distribution transformer(s), have sufficient capacity to simultaneously charge all EVs at all required EV spaces at a minimum of 40 amperes.

The service panel or subpanel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging purposes as "EV CAPABLE" in accordance with the California Electrical Code.

Exceptions:

1.When EV chargers (Level 2 EVSE) are installed in a number equal to or greater than the required number of EV capable spaces.

2.When EV chargers (Level 2 EVSE) are installed in a number less than the required number of EV capable spaces, the number of EV capable spaces required may be reduced by a number equal to the number of EV chargers installed.

Notes:

a.Construction documents are intended to demonstrate the project's capability and capacity for facilitating future EV charging.

b.There is no requirement for EV spaces to be constructed or available until receptacles for EV charging or EV chargers are installed for use.

2.EV Ready. Twenty-five (25) percent of the total number of parking spaces shall be equipped with low power Level 2 EV charging receptacles. For multifamily parking facilities, no more than one receptacle is required per dwelling unit when more than one parking space is provided for use by a single dwelling unit.

Exception: Areas of parking facilities served by parking lifts.

4.106.4.2.2 Multifamily development projects with 20 or more dwelling units, hotels and motels with 20 or more sleeping units or guest rooms.
The number of dwelling units, sleeping units or guest rooms shall be based on all buildings on a project site subject to this section.

1.EV Capable. Ten (10) percent of the total number of parking spaces on a building site, provided for all types of parking facilities, shall be electric vehicle charging spaces (EV spaces) capable of supporting future Level 2 EVSE. Electrical load calculations shall demonstrate that the electrical panel service capacity and electrical system, including any on-site distribution transformer(s), have sufficient capacity to simultaneously charge all EVs at all required EV spaces at a minimum of 40 amperes.

The service panel or subpanel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging purposes as "EV CAPABLE" in accordance with the California Electrical Code.

Exception: When EV chargers (Level 2 EVSE) are installed in a number greater than five (5) percent of parking spaces required by Section 4.106.4.2.2, Item 3, the number of EV capable spaces required may be reduced by a number equal to the number of EV chargers installed over the five (5) percent required.

Notes:
a.Construction documents shall show locations of future EV spaces.
b.There is no requirement for EV spaces to be constructed or available until receptacles for EV charging or EV chargers are installed for use.

2.EV Ready. Twenty-five (25) percent of the total number of parking spaces shall be equipped with low power Level 2 EV charging receptacles. For multifamily parking facilities, no more than one receptacle is required per dwelling unit when more than one parking space is provided for use by a single dwelling unit.

Exception: Areas of parking facilities served by parking lifts.

3.EV Chargers. Five (5) percent of the total number of parking spaces shall be equipped with Level 2 EVSE. Where common use parking is provided, at least one EV charger shall be located in the common use parking area and shall be available for use by all residents or guests.

When low power Level 2 EV charging receptacles or Level 2 EVSE are installed beyond the minimum required, an automatic load management system (ALMS) may be used to reduce the maximum required electrical capacity to each space served by the ALMS. The electrical system and any on-site distribution transformers shall have sufficient capacity to deliver at least 3.3 kW simultaneously to each EV charging station (EVCS) served by the ALMS. The branch circuit shall have a minimum capacity of 40 amperes, and installed EVSE shall have a capacity of not less than 30 amperes. ALMS shall not be used to reduce the minimum required electrical capacity to the required EV capable spaces.

4.106.4.2.2.1 Electric vehicle charging stations (EVCS).
Electric vehicle charging stations required by Section 4.106.4.2.2, Item 3, shall comply with Section 4.106.4.2.2.1.

Exception: Electric vehicle charging stations serving public accommodations, public housing, motels and hotels shall not be required to comply with this section. See California Building Code, Chapter 11B, for applicable requirements.

4.106.4.2.2.1.1 Location.
EVCS shall comply with at least one of the following options:

1.The charging space shall be located adjacent to an accessible parking space meeting the requirements of the California Building Code, Chapter 11A, to allow use of the EV charger from the accessible parking space.

2.The charging space shall be located on an accessible route, as defined in the California Building Code, Chapter 2, to the building.

Exception: Electric vehicle charging stations designed and constructed in compliance with the California Building Code, Chapter 11B, are not required to comply with Section 4.106.4.2.2.1.1 and Section 4.106.4.2.2.1.2, Item 3.

4.106.4.2.2.1.2 Electric vehicle charging stations (EVCS) dimensions.
The charging spaces shall be designed to comply with the following:

1.The minimum length of each EV space shall be 18 feet (5486 mm).

2.The minimum width of each EV space shall be 9 feet (2743 mm).

3.One in every 25 charging spaces, but not less than one, shall also have an 8-foot (2438 mm) wide minimum aisle. A 5-foot (1524 mm) wide minimum aisle shall be permitted provided the minimum width of the EV space is 12 feet (3658 mm).

a.Surface slope for this EV space and the aisle shall not exceed 1 unit vertical in 48 units horizontal (2.083 percent slope) in any direction.

4.106.4.2.2.1.3 Accessible EV spaces.
In addition to the requirements in Sections 4.106.4.2.2.1.1 and 4.106.4.2.2.1.2, all EVSE, when installed, shall comply with the accessibility provisions for EV chargers in the California Building Code, Chapter 11B. EV ready spaces and EVCS in multifamily developments shall comply with California Building Code, Chapter 11A, Section 1109A.

4.106.4.2.3 EV space requirements.
1.Single EV space required. Install a listed raceway capable of accommodating a 208/240-volt dedicated branch circuit. The raceway shall not be less than trade size 1 (nominal 1-inch inside diameter). The raceway shall originate at the main service or subpanel and shall terminate into a listed cabinet, box or enclosure in close proximity to the location or the proposed location of the EV space. Construction documents shall identify the raceway termination point, receptacle or charger location, as applicable. The service panel and/ or subpanel shall have a 40-ampere minimum dedicated branch circuit, including branch circuit overcurrent protective device installed, or space(s) reserved to permit installation of a branch circuit overcurrent protective device.

Exception: A raceway is not required if a minimum 40-ampere 208/240-volt dedicated EV branch circuit is installed in close proximity to the location or the proposed location of the EV space, at the time of original construction in accordance with the California Electrical Code.

2.Multiple EV spaces required. Construction documents shall indicate the raceway termination point and the location of installed or future EV spaces, receptacles or EV chargers. Construction documents shall also provide information on amperage of installed or future receptacles or EVSE, raceway method(s), wiring schematics and electrical load calculations. Plan design shall be based upon a 40-ampere minimum branch circuit. Required raceways and related components that are planned to be installed underground, enclosed, inaccessible or in concealed areas and spaces shall be installed at the time of original construction.
Exception: A raceway is not required if a minimum 40-ampere 208/240-volt dedicated EV branch circuit is installed in close proximity to the location or the proposed location of the EV space at the time of original construction in accordance with the California Electrical Code.
4.106.4.2.4 Identification.
The service panel or subpanel circuit directory shall identify the overcurrent protective device space(s) reserved for future EV charging purposes as "EV CAPABLE" in accordance with the California Electrical Code.
4.106.4.2.5 Electric Vehicle Ready Space Signage.
Electric vehicle ready spaces shall be identified by signage or pavement markings, in compliance with Caltrans Traffic Operations Policy Directive 13-01 (Zero Emission Vehicle Signs and Pavement Markings) or its successor(s).

4.106.4.3 Electric vehicle charging for additions and alterations of parking facilities serving existing multifamily buildings.
When new parking facilities are added, or electrical systems or lighting of existing parking facilities are added or altered and the work requires a building permit, ten (10) percent of the total number of parking spaces added or altered shall be electric vehicle charging spaces (EV spaces) capable of supporting future Level 2 EVSE.

Notes:
1.Construction documents are intended to demonstrate the project's capability and capacity for facilitating future EV charging.
2.There is no requirement for EV spaces to be constructed or available until EV chargers are installed for use.

DIVISION 4.2 ENERGY EFFICIENCY

4.201 GENERAL
4.201.1 SCOPE. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.

DIVISION 4.3 WATER EFFICIENCY AND CONSERVATION

4.303 INDOOR WATER USE
4.303.1 WATER CONSERVING PLUMBING FIXTURES AND FITTINGS. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the sections 4.303.1.1, 4.303.1.2, 4.303.1.3, and 4.303.4.4.

Note: All noncompliant plumbing fixtures in any residential real property shall be replaced with water-conserving plumbing fixtures. Plumbing fixture replacement is required prior to issuance of a certificate of final completion, certificate of occupancy, or final permit approval by the local building department. See Civil Code Section 1101.1, et seq., for the definition of a noncompliant plumbing fixture, types of residential buildings affected and other important enactment dates.

4.303.1.1 Water Closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-type Toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

4.303.1.2 Urinals. The effective flush volume of wall mounted urinals shall not exceed 0.125 gallons per flush.The effective flush volume of all other urinals shall not exceed 0.5 gallons per flush.

4.303.1.3 Showerheads.

4.303.1.3.1 Single Showerhead. Showerheads shall have a maximum flow rate of not more than 1.8 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

4.303.1.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all the showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi, or the shower shall be designed to only allow one shower outlet to be in operation at a time.

Note: A hand-held shower shall be considered a showerhead.

4.303.1.4 Faucets.

4.303.1.4.1 Residential Lavatory Faucets. The maximum flow rate of residential lavatory faucets shall not exceed 1.2 gallons per minute at 60 psi. The minimum flow rate of residential lavatory faucets shall not be less than 0.8 gallons per minute at 20 psi.

4.303.1.4.2 Lavatory Faucets in Common and Public Use Areas. The maximum flow rate of lavatory faucets installed in common and public use areas (outside of dwellings or sleeping units) in residential buildings shall not exceed 0.5 gallons per minute at 60 psi.

4.303.1.4.3 Metering Faucets. Metering faucets when installed in residential buildings shall not deliver more than 0.2 gallons per cycle.

4.303.1.4.4 Kitchen Faucets. The maximum flow rate of kitchen faucets shall not exceed 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

Note: Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

4.303.1.4.5 Pre-rinse spray valves.
When installed, shall meet the requirements in the *California Code of Regulations,* Title 20 (Appliance Efficiency Regulations), Sections 1605.1 (h)(4) Table H-2, Section 1605.3 (h)(4)(A), and Section 1607 (d)(7) and shall be equipped with an integral automatic shutoff.

FOR REFERENCE ONLY: The following table and code section have been reprinted from the *California Code of Regulations,* Title 20 (Appliance Efficiency Regulations),Section 1605.1 (h)(4) and Section 1605.3 (h)(4)(A).

Title 20 Section 1605.3 (h)(4)(A): Commercial prerinse spray values manufactured on or after January 1, 2006, shall have a minimum spray force of not less than 4.0 ounces-force (ozf)[113 grams-force(gf)]

4.303.2 Submeters for multifamily buildings and dwelling units in mixed-used residential/commercial buildings.
Submeters shall be installed to measure water usage of individual rental dwelling units in accordance with the *California Plumbing Code.*

4.303.3 Standards for plumbing fixtures and fittings. Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code,* and shall meet the applicable standards referenced in Table 1701.1 of the *California Plumbing Code.*

TABLE - MAXIMUM FIXTURE WATER USE

FIXTURE TYPE	FLOW RATE
SHOWER HEADS (RESIDENTIAL)	1.8 GMP @ 80 PSI
LAVATORY FAUCETS (RESIDENTIAL)	MAX. 1.2 GPM @ 60 PSI MIN. 0.8 GPM @ 20PSI
LAVATORY FAUCETS IN COMMON & PUBLIC USE AREAS	0.5 GPM @ 60 PSI
KITCHEN FAUCETS	1.8 GPM @ 60 PSI
METERING FAUCETS	0.2 GAL/CYCLE
WATER CLOSET	1.28 GAL/FLUSH
URINALS	0.125 GAL/FLUSH

4.304 OUTDOOR WATER USE
4.304.1 OUTDOOR POTABLE WATER USE IN LANDSCAPE AREAS. Residential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELO), whichever is more stringent.

NOTES:
1. The Model Water Efficient Landscape Ordinance (MWELO) is located in the *California Code Regulations,* Title 23, Chapter 2.7, Division 2. MWELO and supporting documents, including water budget calculator, are available at: https://www.water.ca.gov/

DIVISION 4.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

4.406 ENHANCED DURABILITY AND REDUCED MAINTENANCE
4.406.1 RODENT PROOFING. Annular spaces around pipes, electric cables, conduits or other openings in sole/bottom plates at exterior walls shall be protected against the passage of rodents by closing such openings with cement mortar, concrete masonry or a similar method acceptable to the enforcing agency.

4.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING
4.408.1 CONSTRUCTION WASTE MANAGEMENT. Recycle and/or salvage for reuse a minimum of 65 percent of the non-hazardous construction and demolition waste in accordance with either Section 4.408.2, 4.408.3 or 4.408.4, or meet a more stringent local construction and demolition waste management ordinance.

Exceptions:
1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist or are not located reasonably close to the jobsite.
3. The enforcing agency may make exceptions to the requirements of this section when isolated jobsites are located in areas beyond the haul boundaries of the diversion facility.

4.408.2 CONSTRUCTION WASTE MANAGEMENT PLAN. Submit a construction waste management plan in conformance with Items 1 through 5. The construction waste management plan shall be updated as necessary and shall be available during construction for examination by the enforcing agency.

1. Identify the construction and demolition waste materials to be diverted from disposal by recycling, reuse on the project or salvage for future use or sale.
2. Specify if construction and demolition waste materials will be sorted on-site (source separated) or bulk mixed (single stream).
3. Identify diversion facilities where the construction and demolition waste material collected will be taken.
4. Identify construction methods employed to reduce the amount of construction and demolition waste generated.
5. Specify that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

4.408.3 WASTE MANAGEMENT COMPANY. Utilize a waste management company, approved by the enforcing agency, which can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with Section 4.408.1.

Note: The owner or contractor may make the determination if the construction and demolition waste materials will be diverted by a waste management company.

4.408.4 WASTE STREAM REDUCTION ALTERNATIVE [LR]. Projects that generate a total combined weight of construction and demolition waste disposed of in landfills, which do not exceed 3.4 lbs./sq.ft. of the building area shall meet the minimum 65% construction waste reduction requirement in Section 4.408.1

4.408.4.1 WASTE STREAM REDUCTION ALTERNATIVE. Projects that generate a total combined weight of construction and demolition waste disposed of in landfills, which do not exceed 2 pounds per square foot of the building area, shall meet the minimum 65% construction Waste reduction requirement in Section 4.408.1

4.408.5 DOCUMENTATION. Documentation shall be provided to the enforcing agency which demonstrates compliance with Section 4.408.2, items 1 through 5, Section 4.408.3 or Section 4.408.4..

Notes:

1. Sample forms found in "A Guide to the California Green Building Standards Code (Residential)" located at www.hcd.ca.gov/CALGreen.html may be used to assist in documenting compliance with this section.
2. Mixed construction and demolition debris (C & D) processors can be located at the California Department of Resources Recycling and Recovery (CalRecycle).

4.410 BUILDING MAINTENANCE AND OPERATION
4.410.1 OPERATION AND MAINTENANCE MANUAL. At the time of final inspection, a manual, compact disc, web-based reference or other media acceptable to the enforcing agency which includes all of the following shall be placed in the building:

1. Directions to the owner or occupant that the manual shall remain with the building throughout the life cycle of the structure.
2. Operation and maintenance instructions for the following:
a. Equipment and appliances, including water-saving devices and systems, HVAC systems, photovoltaic systems, electric vehicle chargers, water-heating systems and other major appliances and equipment.
b. Roof and yard drainage, including gutters and downspouts.
c. Space conditioning systems, including condensers and air filters.
d. Landscape irrigation systems.
e. Water reuse systems.
3. Information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.
4. Public transportation and/or carpool options available in the area.
5. Educational material on the positive impacts of an interior relative humidity between 30-60 percent and what methods an occupant may use to maintain the relative humidity level in that range.
6. Information about water-conserving landscape and irrigation design and controllers which conserve water.
7. Instructions for maintaining gutters and downspouts and the importance of diverting water at least 5 feet away from the foundation.
8. Information on required routine maintenance measures, including, but not limited to, caulking, painting, grading around the building, etc.
9. Information about state solar energy and incentive programs available.
10. A copy of all special inspections verifications required by the enforcing agency or this code.
11. Information from the Department of Forestry and Fire Protection on maintenance of defensible space around residential structures.
12. Information and/or drawings identifying the location of grab bar reinforcements.

4.410.2 RECYCLING BY OCCUPANTS. Where 5 or more multifamily dwelling units are constructed on a building site, provide readily accessible area(s) that serves all buildings on the site and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waster, and metals, or meet a lawfully enacted local recycling ordinance, if more restrictive.

Exception: Rural jurisdictions that meet and apply for the exemption in Public Resources Code Section 42649.82 (a)(2)(A) et seq. are note required to comply with the organic waste portion of this section.

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT
ROBINA R. WRIGHT
NO. C-32283
RENEWAL DATE 06/30/2025
STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF THE ARCHITECT AND SHALL NOT BE USED ON ANY OTHER PROJECT OR LOCATIONS EXCEPT AS DESCRIBED ON THE DRAWINGS WITHOUT WRITTEN AGREEMENT WITH THE ARCHITECT.

TITLE

GREEN BUILDING MANDATORY MEASURES 1

SCALE 12" = 1'-0"

GBC-1

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
RW	RW

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24" X 36"

2022 CALIFORNIA GREEN BUILDING STANDARDS CODE (January 2023)

RESIDENTIAL MANDATORY MEASURES, SHEET 2

DIVISION 4.5 ENVIRONMENTAL QUALITY

SECTION 4.501 GENERAL
4.501.1 Scope
The provisions of this chapter shall outline means of reducing the quality of air contaminants that are odorous, irritating and/or harmful to the comfort and well being of a building's installers, occupants and neighbors.

SECTION 4.502 DEFINITIONS
5.102.1 DEFINITIONS
The following terms are defined in Chapter 2 *(and are included here for reference)*

AGRIFIBER PRODUCTS. Agrifiber products include wheatboard, strawboard, panel substrates and door cores, not including furniture, fixtures and equipment (FF&E) not considered base building elements.

COMPOSITE WOOD PRODUCTS. Composite wood products include hardwood plywood, particleboard and medium density fiberboard. "Composite wood products" does not include hardboard, structural plywood, structural panels, structural composite lumber, oriented strand board, glued laminated timber, prefabricated wood I-joists or finger-jointed lumber, all as specified in California Code of regulations (CCR), title 17, Section 93120.1.

DIRECT-VENT APPLIANCE. A fuel-burning appliance with a sealed combustion system that draws all air for combustion from the outside atmosphere and discharges all flue gases to the outside atmosphere.
MAXIMUM INCREMENTAL REACTIVITY (MIR). The maximum change in weight of ozone formed by adding a compound to the "Base Reactive Organic Gas (ROG) Mixture" per weight of compound added, expressed to hundredths of a gram (g O^3/g ROC).
Note: MIR values for individual compounds and hydrocarbon solvents are specified in CCR, Title 17, Sections 94700 and 94701.

MOISTURE CONTENT. The weight of the water in wood expressed in percentage of the weight of the oven-dry wood.

PRODUCT-WEIGHTED MIR (PWMIR). The sum of all weighted-MIR for all ingredients in a product subject to this article. The PWMIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).
Note: PWMIR is calculated according to equations found in CCR, Title 17, Section 94521 (a).

REACTIVE ORGANIC COMPOUND (ROC). Any compound that has the potential, once emitted, to contribute to ozone formation in the troposphere.

VOC. A volatile organic compound (VOC) broadly defined as a chemical compound based on carbon chains or rings with vapor pressures greater than 0.1 millimeters of mercury at room temperature. These compounds typically contain hydrogen and may contain oxygen, nitrogen and other elements. See CCR Title 17, Section 94508(a).

4.503 FIREPLACES
4.503.1 GENERAL. Any installed gas fireplace shall be a direct-vent sealed-combustion type. Any installed woodstove or pellet stove shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits. Woodstoves, pellet stoves and fireplaces shall also comply with applicable local ordinances.

4.504 POLLUTANT CONTROL
4.504.1 COVERING OF DUCT OPENINGS & PROTECTION OF MECHANICAL EQUIPMENT DURING CONSTRUCTION. At the time of rough installation, during storage on the construction site and until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of water, dust or debris which may enter the system.

4.504.2 FINISH MATERIAL POLLUTANT CONTROL. Finish materials shall comply with this section.

4.504.2.1 Adhesives, Sealants and Caulks. Adhesives, sealant and caulks used on the project shall meet the requirements of the following standards unless more stringent local or regional air pollution or air quality management district rules apply:
1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits, as shown in Table 4.504.1 or 4.504.2, as applicable. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products, as specified in Subsection 2 below.
2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than 1 pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with section 94507.

4.504.2.2 Paints and Coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Suggested Control Measure, as shown in Table 4.504.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 4.504.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in subsections 4.21, 4.36, and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 4.504.3 shall apply.

4.504.2.3 Aerosol Paints and Coatings. Aerosol paints and coatings shall meet the Product-weighted MIR Limits for ROC in Section 94522(a)(2) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(e)(1) and (f)(1) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8, Rule 49.

4.504.2.4 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:
1. Manufacturer's product specification.
2. Field verification of on-site product containers.

TABLE 4.504.1 - ADHESIVE VOC LIMIT 1,2
(Less Water and Less Exempt Compounds in Grams per Liter)

ARCHITECTURAL APPLICATIONS	VOC LIMIT
INDOOR CARPET ADHESIVES	50
CARPET PAD ADHESIVES	50
OUTDOOR CARPET ADHESIVES	150
WOOD FLOORING ADHESIVES	100
RUBBER FLOOR ADHESIVES	60
SUBFLOOR ADHESIVES	50
CERAMIC TILE ADHESIVES	65
VCT & ASPHALT TILE ADHESIVES	50
DRYWALL & PANEL ADHESIVES	50
COVE BASE ADHESIVES	50
MULTIPURPOSE CONSTRUCTION ADHESIVE	70
STRUCTURAL GLAZING ADHESIVES	100
SINGLE-PLY ROOF MEMBRANE ADHESIVES	250
OTHER ADHESIVES NOT LISTED	50

CONT.

TABLE 4.504.1 - ADHESIVE VOC LIMIT 1,2

SPECIALTY APPLICATIONS	
PVC WELDING	510
CPVC WELDING	490
ABS WELDING	325
PLASTIC CEMENT WELDING	250
ADHESIVE PRIMER FOR PLASTIC	550
CONTACT ADHESIVE	80
SPECIAL PURPOSE CONTACT ADHESIVE	250
STRUCTURAL WOOD MEMBER ADHESIVE	140
TOP & TRIM ADHESIVE	250
SUBSTRATE SPECIFIC APPLICATIONS	
METAL TO METAL	30
PLASTIC FOAMS	50
POROUS MATERIAL (EXCEPT WOOD)	50
WOOD	30
FIBERGLASS	80

1. IF AN ADHESIVE IS USED TO BOND DISSIMILAR SUBSTRATES TOGETHER, THE ADHESIVE WITH THE HIGHEST VOC CONTENT SHALL BE ALLOWED.
2. FOR ADDITIONAL INFORMATION REGARDING METHODS TO MEASURE THE VOC CONTENT SPECIFIED IN THIS TABLE, SEE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168.

TABLE 4.504.2 - SEALANT VOC LIMIT
(Less Water and Less Exempt Compounds in Grams per Liter)

SEALANTS	VOC LIMIT
ARCHITECTURAL	250
MARINE DECK	760
NONMEMBRANE ROOF	300
ROADWAY	250
SINGLE-PLY ROOF MEMBRANE	450
OTHER	420
SEALANT PRIMERS	
ARCHITECTURAL	
NON-POROUS	250
POROUS	775
MODIFIED BITUMINOUS	500
MARINE DECK	760
OTHER	750

Adhesives, sealant and caulks used on the project shall meet the

TABLE 4.504.3 - VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS 2,3
GRAMS OF VOC PER LITER OF COATING, LESS WATER & LESS EXEMPT COMPOUNDS

COATING CATEGORY	VOC LIMIT
FLAT COATINGS	50
NON-FLAT COATINGS	100
NONFLAT-HIGH GLOSS COATINGS	150
SPECIALTY COATINGS	
ALUMINUM ROOF COATINGS	400
BASEMENT SPECIALTY COATINGS	400
BITUMINOUS ROOF COATINGS	50
BITUMINOUS ROOF PRIMERS	350
BOND BREAKERS	350
CONCRETE CURING COMPOUNDS	350
CONCRETE/MASONRY SEALERS	100
DRIVEWAY SEALERS	50
DRY FOG COATINGS	150
FAUX FINISHING COATINGS	350
FIRE RESISTIVE COATINGS	350
FLOOR COATINGS	100
FORM-RELEASE COMPOUNDS	250
GRAPHIC ARTS COATINGS (SIGN PAINTS)	500
HIGH TEMPERATURE COATINGS	420
INDUSTRIAL MAINTENANCE COATINGS	250
LOW SOLIDS COATINGS 1	120
MAGNESITE CEMENT COATINGS	450
MASTIC TEXTURE COATINGS	100
METALLIC PIGMENTED COATINGS	500
MULTICOLOR COATINGS	250
PRETREATMENT WASH PRIMERS	420
PRIMERS, SEALERS, & UNDERCOATERS	100
REACTIVE PENETRATING SEALERS	350
RECYCLED COATINGS	250
ROOF COATINGS	50
RUST PREVENTATIVE COATINGS	250
SHELLACS	
CLEAR	730
OPAQUE	550
SPECIALTY PRIMERS, SEALERS & UNDERCOATERS	100
STAINS	250

Adhesives, sealant and caulks used on the project shall meet the

TABLE 4.504.3 - VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS 2,3

SPECIALTY COATINGS (CONT.)	VOC LIMIT
STONE CONSOLIDANTS	450
SWIMMING POOL COATINGS	340
TRAFFIC MARKING COATINGS	100
TUB & TILE REFINISH COATINGS	420
WATERPROOFING MEMBRANES	250
WOOD COATINGS	275
WOOD PRESERVATIVES	350
ZINC-RICH PRIMERS	340

1. GRAMS OF VOC PER LITER OF COATING, INCLUDING WATER & EXEMPT COMPOUNDS

2. THE SPECIFIED LIMITS REMAIN IN EFFECT UNLESS REVISED LIMITS ARE LISTED IN SUBSEQUENT COLUMNS IN THE TABLE.

3. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIFORNIA AIR RESOURCES BOARD, ARCHITECTURAL COATINGS SUGGESTED CONTROL MEASURE, FEB. 1, 2008. MORE INFORMATION IS AVAILABLE FROM THE AIR RESOURCES BOARD.

TABLE 4.504.5 - FORMALDEHYDE LIMITS 1
MAXIMUM FORMALDEHYDE EMISSIONS IN PARTS PER MILLION

PRODUCT	CURRENT LIMIT
HARDWOOD PLYWOOD VENEER CORE	0.05
HARDWOOD PLYWOOD COMPOSITE CORE	0.05
PARTICLE BOARD	0.09
MEDIUM DENSITY FIBERBOARD	0.11
THIN MEDIUM DENSITY FIBERBOARD 2	0.13

1. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIF. AIR RESOURCES BOARD, AIR TOXIC CONTROL MEASURE FOR COMPOSITE WOOD AS TESTED IN ACCORDANCE WITH ASTM E 1333. FOR ADDITIONAL INFORMATION, SEE CALIF. CODE OF REGULATIONS, TITLE 17, SECTIONS 93120 THROUGH 93120.12.

2. THIN MEDIUM DENSITY FIBERBOARD HAS A MAXIMUM THICKNESS OF 5/16" (8 MM).

DIVISION 4.5 ENVIRONMENTAL QUALITY (CONT.)

4.504.3 CARPET SYSTEMS. All carpet installed in the building interior shall meet the requirements of the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emission testing method for California Specification 01350)

See California Department of Public Health's website for certification programs and testing labs.

https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx.

4.504.3.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emission testing method for California Specification 01350)

See California Department of Public Health's website for certification programs and testing labs.

https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx.

4.504.3.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 4.504.1.

4.504.4 RESILIENT FLOORING SYSTEMS. Where resilient flooring is installed , at least 80% of floor area receiving resilient flooring shall meet the requirements of the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emission testing method for California Specification 01350)

See California Department of Public Health's website for certification programs and testing labs.

hhttps://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx.

4.504.5 COMPOSITE WOOD PRODUCTS. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the buildings shall meet the requirements for formaldehyde as specified in ARB's Air Toxic Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections, as shown in Table 4.504.5

4.504.5.1 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq.).
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269, European 636 3S standards, and Canadian CSA 0121, CSA 0151, CSA 0153 and CSA 0325 standards.
5. Other methods acceptable to the enforcing agency.

4.505 INTERIOR MOISTURE CONTROL
4.505.1 General. Buildings shall meet or exceed the provisions of the *California Building Standards Code*.

4.505.2 CONCRETE SLAB FOUNDATIONS. Concrete slab foundations required to have a vapor retarder by California Building Code, Chapter 19, or concrete slab-on-ground floors required to have a vapor retarder by the California Residential Code, Chapter 5, shall also comply with this section.

4.505.2.1 Capillary break. A capillary break shall be installed in compliance with at least one of the following:

1. A 4-inch (101.6 mm) thick base of 1/2 inch (12.7mm) or larger clean aggregate shall be provided with a vapor barrier in direct contact with concrete and a concrete mix design, which will address bleeding, shrinkage, and curling, shall be used. For additional information, see American Concrete Institute, ACI 302.2R-06.
2. Other equivalent methods approved by the enforcing agency.
3. A slab design specified by a licensed design professional.

4.505.3 MOISTURE CONTENT OF BUILDING MATERIALS. Building materials with visible signs of water damage shall not be installed. Wall and floor framing shall not be enclosed when the framing members exceed 19 percent moisture content. Moisture content shall be verified in compliance with the following:

1. Moisture content shall be determined with either a probe-type or contact-type moisture meter. Equivalent moisture verification methods may be approved by the enforcing agency and shall satisfy requirements found in Section 101.8 of this code.
2. Moisture readings shall be taken at a point 2 feet (610 mm) to 4 feet (1219 mm) from the grade stamped end of each piece verified.
3. At least three random moisture readings shall be performed on wall and floor framing with documentation acceptable to the enforcing agency provided at the time of approval to enclose the wall and floor framing.

Insulation products which are visibly wet or have a high moisture content shall be replaced or allowed to dry prior to enclosure in wall or floor cavities. Wet-applied insulation products shall follow the manufacturers' drying recommendations prior to enclosure.

4.506 INDOOR AIR QUALITY AND EXHAUST
4.506.1 Bathroom exhaust fans. Each bathroom shall be mechanically ventilated and shall comply with the following:

1. Fans shall be ENERGY STAR compliant and be ducted to terminate outside the building.
2. Unless functioning as a component of a whole house ventilation system, fans must be controlled by a humidity control.

a. Humidity controls shall be capable of adjustment between a relative humidity range less than or equal to 50% to a maximum of 80%. A humidity control may utilize manual or automatic means of adjustment.
b. A humidity control may be a separate component to the exhaust fan and is not required to be integral (i.e., built-in)

Notes:
1. For the purposes of this section, a bathroom is a room which contains a bathtub, shower or tub/shower combination.
2. Lighting integral to bathroom exhaust fans shall comply with the *California Energy Code*.

4.507 ENVIRONMENTAL COMFORT
4.507.2 HEATING AND AIR-CONDITIONING SYSTEM DESIGN. Heating and air conditioning systems shall be sized, designed and have their equipment selected using the following methods:

1. The heat loss and heat gain is established according to ANSI/ACCA 2 Manual J - 2011 (Residential Load Calculation), ASHRAE handbooks or other equivalent design software or methods.
2. Duct systems are sized according to ANSI/ACCA 1 Manual D - 2014 (Residential Duct Systems), ASHRAE handbooks or other equivalent design software or methods.
3. Select heating and cooling equipment according to ANSI/ACCA 3 Manual S - 2014 (Residential Equipment Selection), or other equivalent design software or methods.

Exception: Use of alternate design temperatures necessary to ensure the system functions are acceptable.

CHAPTER 7
INSTALLER & SPECIAL INSPECTOR QUALIFICATIONS

702 QUALIFICATIONS
702.1 INSTALLER TRAINING. HVAC system installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program. Uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or contractor licensed to install HVAC systems. Examples of acceptable HVAC training and certification programs include but are not limited to the following:

1. State certified apprenticeship programs.
2. Public utility training programs.
3. Training programs sponsored by trade, labor or statewide energy consulting or verification organizations.
4. Programs sponsored by manufacturing organizations.
5. Other programs acceptable to the enforcing agency.

702.2 SPECIAL INSPECTION [HCD]. When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition to other certifications or qualifications acceptable to the enforcing agency, the following certifications or education may be considered by the enforcing agency when evaluating the qualifications of a special inspector:

1. Certification by a national or regional green building program or standard publisher.
2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, and home energy auditors.
3. Successful completion of a third party apprentice training program in the appropriate trade.
4. Other programs acceptable to the enforcing agency.

Notes:
1. Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.
2. HERS raters are special inspectors certified by the California Energy Commission (CEC) to rate homes in California according to the Home Energy Rating System (HERS).

[BSC] When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition, the special inspector shall have a certification from a recognized state, national or international association, as determined by the local agency. The area of certification shall be closely related to the primary job function, as determined by the local agency.

Note: Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.

703 VERIFICATIONS
703.1 DOCUMENTATION. Documentation used to show compliance with this code shall include but is not limited to, construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which demonstrate substantial conformance. When specific documentation or special inspection is necessary to verify compliance, that method of compliance will be specified in the appropriate section or identified applicable checklist.

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OPTION #1

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PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

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SEAL & SIGNATURE

LICENSED ARCHITECT — ROBINA R. WRIGHT — NO. C-32283 — RENEWAL DATE 08/30/2025 — STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

GREEN BUILDING MANDATORY MEASURES 2

SCALE 12" = 1'-0"

GBC-2

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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RW	RW

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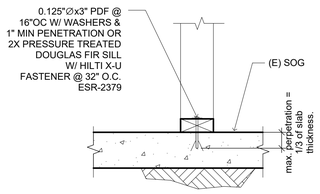
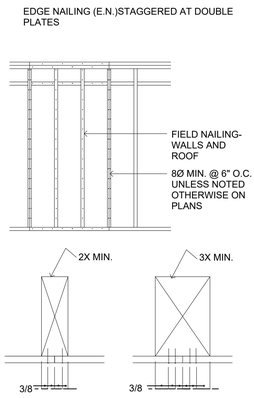
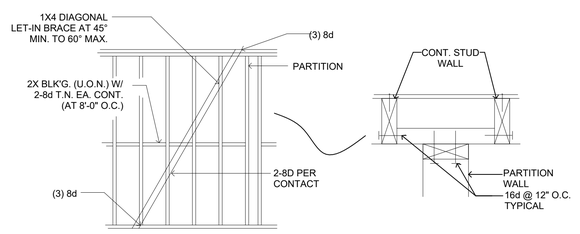


SILL PLATE @ NON-LOAD BEARING WALL
NTS **E10**

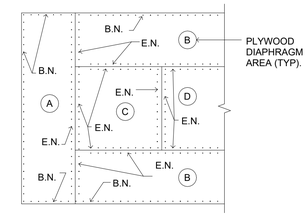


STAGGERED NAILING DETAIL

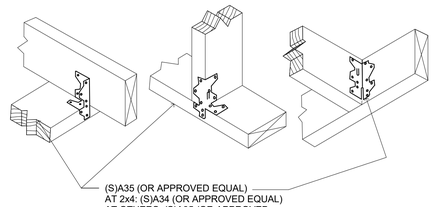
PLYWOOD SIDING NAILS
NTS **E7**



TYPICAL WALL ELEVATION
NTS **E6**

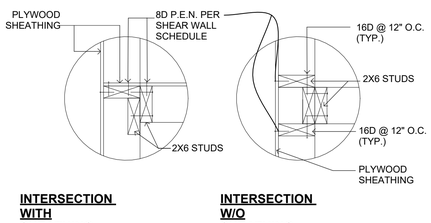


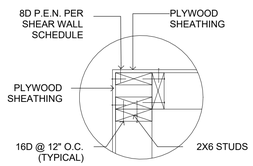
PLYWOOD NAILING
NTS **E1**



NOTES:
1. NAILS TO BE MINIMUM OF 8d COMMON x 1~8"

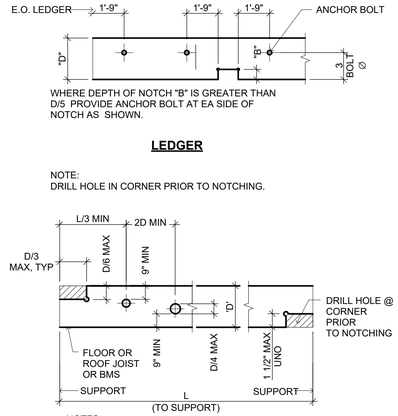
TYPICAL FRAMING ANCHOR CONFIGURATION
NTS **D10**





EXTERIOR CORNER

TYPICAL STUD ANGLES & CORNERS, U.O.N.
NTS **D7**



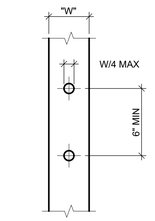
WHERE DEPTH OF NOTCH "B" IS GREATER THAN D/5 PROVIDE ANCHOR BOLT AT EA SIDE OF NOTCH AS SHOWN.

LEDGER

NOTE:
DRILL HOLE IN CORNER PRIOR TO NOTCHING.

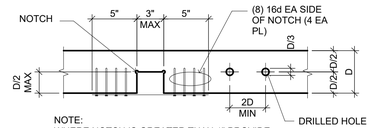
NOTES:
1. NOTCHES AND DRILLED HOLES AS SHOWN ABOVE MAY BE USED ONLY WITH THE APPROVAL OF THE SEOR.
2. DO NOT PLACE NOTCH BETWEEN SUPPORTS.

PURLINS & BEAMS



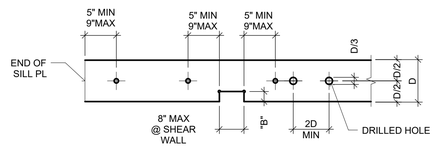
WOOD STUD

NOTE:
WHEN Ø OF HOLE EXCEEDS D/3 IT SHALL BE TREATED AS A NOTCH.



NOTE:
WHERE NOTCH IS GREATER THAN 1" PROVIDE 10GA STRAP W/ WIDTH SAME AS DBL TOP PL. TOP PL OF SHEARWALLS SHALL NOT BE NOTCHED UNLESS SPECIFICALLY DETAILED.

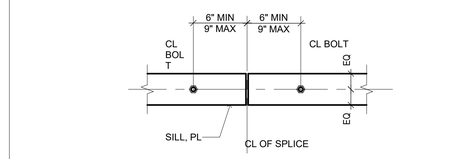
DOUBLE TOP PLATE



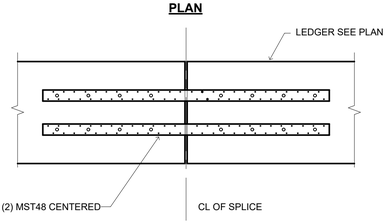
NOTE:
WHERE DEPTH OF NOTCH "B" IS GREATER THAN D/5 PROVIDE ANCHOR BOLT EA SIDE OF NOTCH AS PER END REQUIREMENT. NO MORE THAN ONE NOTCH IS PERMITTED IN EVERY 12'-0" @ SHEARWALL.

SILL PL

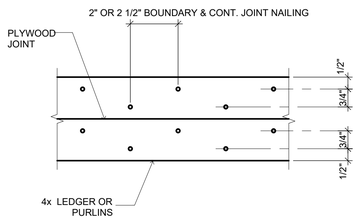
HOLES & NOTCHING IN WOOD FRAMING
NTS **D1**



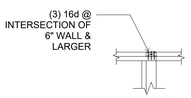
PLAN



SPLICE FOR SILL, PLATES, & LEDGERS
NTS **A10**



PLYWOOD NAILING
NTS **A7**

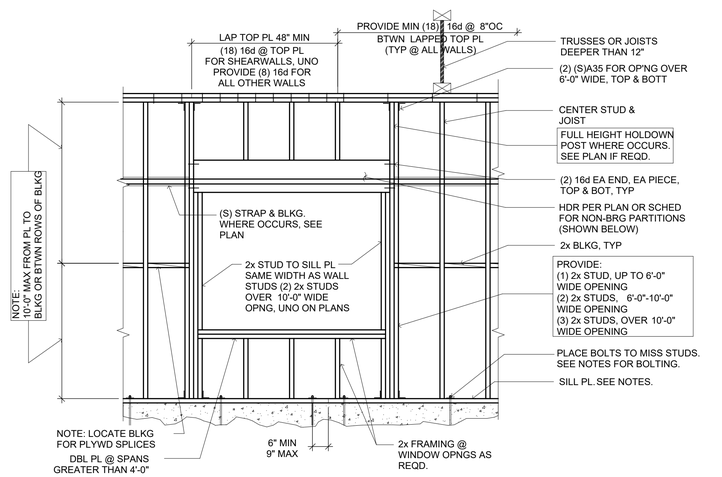


TYPICAL CONDITION @ CORNER PL LAP

NON-BEARING PARTITION HEADERS			
SPAN	2x4 STUD WALL	2x6 STUD WALL	2x8 STUD WALL
UP TO 8'-0"	(2) 2x6	(3) 2x6	(4) 2x6
8'-1" TO 10'-0"	(2) 2x8	(3) 2x8	(4) 2x8
10'-1" TO 12'-0"	(2) 2x10	(3) 2x10	(4) 2x10

NOTES:
1. SEE PLAN FOR HEADERS REQD @ BEARING WALLS.
2. SOLID HEADERS MAY BE USED W/ SAME THICKNESS & DEPTH AS BUILT-UP HEADERS SHOWN ABOVE.

NOTE:
STUD SPACING = 16"OC
NAILING = SEE NAILING SCHEDULE



WALL & OPENING FRAMING
NTS **A1**

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PWP23-005

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CAPITAL PROJECTS DIVISION

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SEAL & SIGNATURE

LICENSED ARCHITECT ROBINA R. WRIGHT NO. C-32283 RENEWAL DATE 06/30/2025 STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

TYPICAL WOOD FRAMING DETAILS

SCALE 1/4" = 1'-0"

S-101

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
RL	RW

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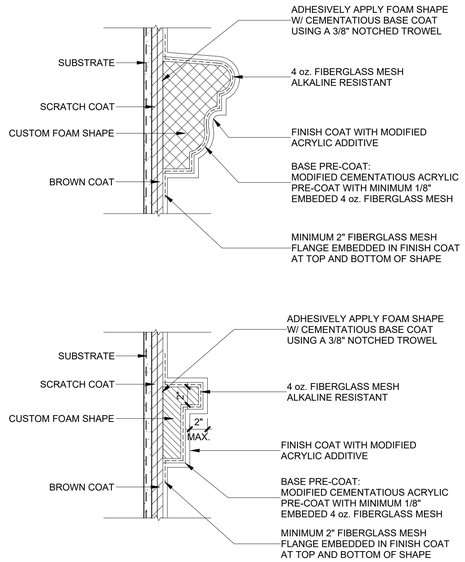
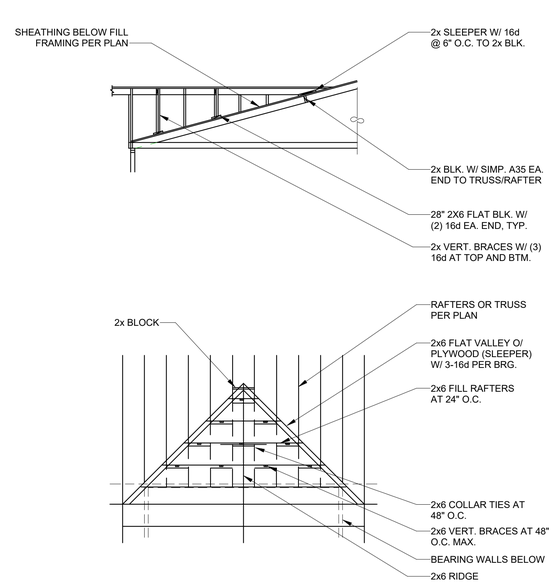


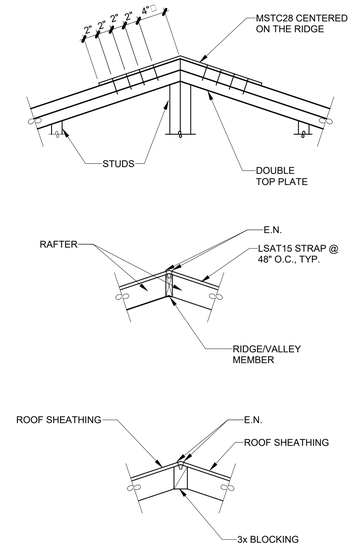
OPTIONAL FOAM TRIMS — F10

1 1/2" = 1'-0"



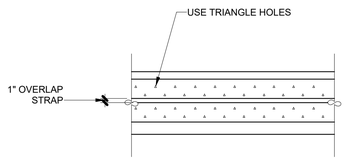
TYPICAL "CALIFORNIA FILL" FRAMING — F6

NTS



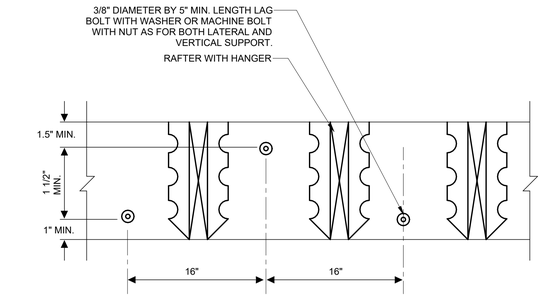
RIDGE TIE AT STUD WALL — F3

NTS



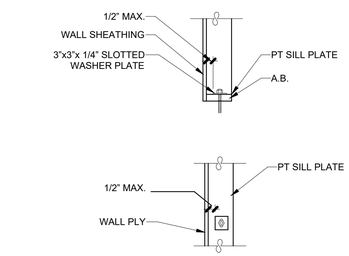
DOUBLE STEEL COIL STRAP — D10

NTS



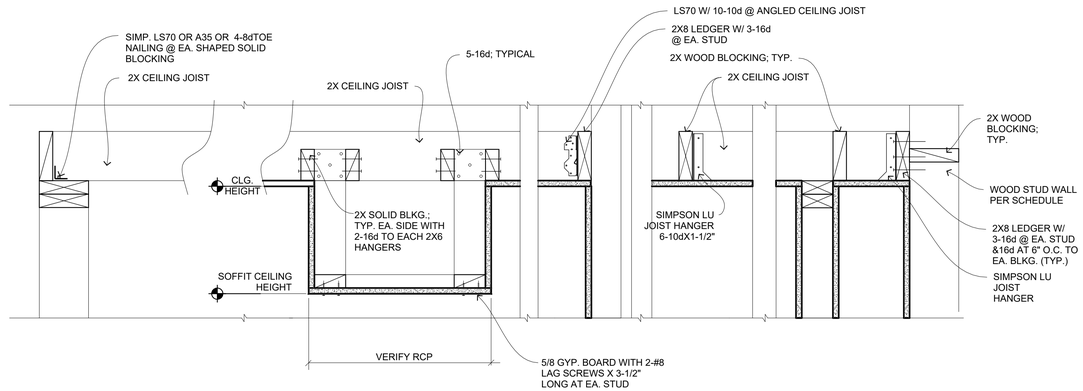
TYPICAL LEDGER DETAILS — D6

NTS



WASHER PLATE PLACEMENT — D3

NTS



TYPICAL WOOD FRAMED CEILING — A3

NTS

1. ALL BUTT WELDS SHALL BE COMPLETE PENETRATION WELDS.
2. ALL WELDING OF STRUCTURAL STEEL MEMBERS SHALL BE DONE BY CURRENTLY CERTIFIED WELDERS AND DONE IN CONFORMANCE WITH THE A.I.S.C. AND A.W.S. SPECIFICATIONS. ALL WELDING SHALL BE ACCOMPLISHED USING THE SHIELD METAL ARC WELDING PROCESS (SMAW WITH E7-XX ELECTRODES OF THE SUBMERGED ARC WELDING PROCESS (SAW) WITH E7X-EXXX ELECTRODES OR THE FLUX-CORED ARC WELDING PROCESS (FCAW WITH E71T-8 ELECTRODES . (E70T-4 ELECTRODES ALLOWED FOR SHOP WELDING ONLY) LOW HYDROGEN ELECTRODES SHALL BE USED AND KEPT DRY, AND PARENT METALS SHALL BE PREHEATED IN ACCORDANCE WITH AWS STANDARDS. NO WELDING PERMITTED ON MEMBERS SUPPORTING LOADS.
3. WHERE THE CONTRACTOR REQUESTS WELDING TO BE USED IN LIEU OF BOLTED CONNECTIONS SUCH WELDING SHALL BE DONE ONLY WITH THE ENGINEERS PRIOR APPROVAL.
4. HOLES PUNCHED OR DRILLED IN BEAMS SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE ON THE DRAWING: HOLES FOR BOLTS SHALL BE 1/16" LARGER THAN THE NOMINAL DIAMETER OF THE BOLT WHERE CONNECTION IS OF SHEAR TYPE, AND 3/16" LARGER WHERE CONNECTION IS OF BEARING TYPE ON CONCRETE OR MASONRY.
5. ALL STRUCTURAL STEEL AND MISCELLANEOUS STEEL SHALL RECEIVE ONE SHOP COAT OF RED OXIDE OR ZINC CHROMATE OR APPROVED EQUAL BASE.
6. ALL STRUCTURAL & MISCELLANEOUS STEEL SHALL CONFORM TO THE FOLLOWING STANDARDS:
   - A. WIDE FLANGE MEMBERS (W, S, AND HP SHAPES) ARE TO BE ASTM A992 (Fy=50ksi) IN ACCORDANCE WITH AISC.
   - B. CHANNELS, ANGLES, TEES, AND MISCELLANEOUS AISC STEEL SHAPES ARE TO BE ASTM A36. Fy=36 KSI MIN. UNO
   - C. HIGH STRENGTH BOLTS: ASTM A325N 1/2" TO 1" DIAMETER INCLUSIVE FY=92 KSI. 1 1/8" TO 1 1/2" DIAMETER INCLUSIVE FY=81 KSI
   - D. ASTM A-307 BOLTS SHALL BE USED UNLESS OTHERWISE NOTED.
   - E. STRUCTURAL PIPE SHALL CONFORM TO A.S.T.M. A-53 GRADE "B" Fy=35 KSI. MIN.
   - F. STRUCTURAL TUBING SHALL CONFORM TO A.S.T.M. A-500 GRADE "C" Fy=50 KSI.
   - G. ANCHOR BOLTS: ASTM A307 TYPICAL.
   - H. HEADED STUDS: ASTM A108.
   - I. WELDING ELECTRODES: E70XX
   - J. ALL PLATES, MISC. SHAPES, AND STRUCTURAL SHAPES (AISC, etc.) USED AS PART OF A CONNECTION, DOUBLER PLATES, CONTINUITY PLATES, ETC. IN THESE PLANS SHALL BE MADE OF EQUAL MATERIAL (MATERIAL PROPERTIES, GRADE, YIELD STRENGTH, ETC.) AS THE MAIN STRUCTURAL MEMBERS BEING CONNECTED, TYP.
7. LIGHT GAUGE COLD-FORMED STRUCTURAL STEEL SHALL CONFORM TO THE SPECIFICATIONS OF THE AISI - GENERAL - 04 AND AISI - NAS - 01
8. LIGHT GAUGE STRUCTURAL STEEL SHALL BE SHAPED AS SHOWN IN THE A.I.S.I. DESIGN MANUAL, UNLESS SPECIFICALLY OTHERWISE CALLED FOR.
9. ALL ENDS OF EXPOSED STRUCTURAL SHAPES AND TUBE STEEL MEMBERS SHALL HAVE 1/4" CAP PLATE WITH WELDS GRIND SMOOTH.
10. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL TEMPORARY SUPPORTS REQUIRED FOR ERECTION. IF ERECTION BRACING IS REQUIRED IT IS TO BE PREPARED BY A LICENSED ENGINEER.
11. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST REVISED EDITION OF THE AISC MANUAL OF STEEL CONSTRUCTION, WHICH INCLUDES THE SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS, THE CODE OF STANDARD PRACTICE AND THE AWS STRUCTURAL WELDING CODE.
12. GROUTING OF COLUMN BASE PLATES: BASE PLATES SHALL BE DRYPACKED OR GROUTED WITH 1 1/2" NON-SHRINK GROUT OR EQUAL. MINIMUM COMPRESSIVE STRENGTH SHALL BE 4000 PSI AT 28 DAYS. ALL SURFACES SHALL BE PROPERLY CLEANED OF FOREIGN MATERIAL PRIOR TO THE GROUTING OPERATION.
13. FULL PENETRATION WELDED CONNECTIONS (100%) AT MOMENT FRAMES, BRACED FRAMES, AND ALL FULL PENETRATIONS FIELD WELDS SHALL HAVE ULTRASONIC TESTING FOR COMPLIANCE WITH AISC 13th EDITION ULTRASONIC TESTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING AGENCY THAT HAS BEEN INSPECTED BY THE NATIONAL STANDARDS. TESTING INSPECTIONS SHALL BE QUALIFIED BY ASNT BUREAU OF RECOMMENDED PRACTICE SNT-TC-A1. PROVIDE PROPER SURFACE PREP. AND BACKUP PLATES AS REQUIRED PER AISC AND AWS.
14. ALL EXPOSED WELDS SHALL BE FILLED AND GROUND SMOOTH WHERE METAL COULD COME IN CONTACT WITH THE PUBLIC. UNLESS WELDS ARE PERMITTED BY THE PROJECT ARCHITECT.
15. NO HOLES OTHER THAN THOSE SPECIFICALLY DETAILED SHALL BE ALLOWED THRU STRUCTURAL STEEL MEMBERS. BOLT HOLES SHALL CONFORM TO AISC SPECIFICATION, AND SHALL BE STANDARD HOLES UNLESS OTHERWISE NOTED. NO CUTTING OR BURNING OF STRUCTURAL STEEL WILL BE PERMITTED WITHOUT PRIOR CONSENT OF THIS ENGINEER.
16. HIGH STRENGTH BOLTS WHERE INDICATED IN THE PLANS OR DETAILED SHALL CONFORM TO A.S.T.M. A325 OR A490, AND BE PROVIDED WITH HARDENED WASHERS CONFORMING TO A.S.T.M. F436. SLIP-CRITICAL TYPE BOLTS (A325-SC OR A490-SC) SHALL BE TWIST-OFF-TYPE TENSION-CONTROL BOLT ASSEMBLY. AT CONTRACTORS OPTION, THE COMBINATION OF HIGH STRENGTH BOLTS AND DIRECT TENSION LOAD INDICATING WASHERS CONFORMING TO ASTM F-959 ARE ACCEPTABLE SUBSTITUTIONS. CONTACT SURFACES SHALL BE CLEAN MILL SCALE OR CLASS A QUALIFIED COATINGS.
17. ALL SHOP AND FIELD BOLTED CONNECTIONS SHALL BE IN ACCORDANCE WITH ASTM A-307 USING UNFINISHED AMERICAN STANDARD REGULAR BOLTS, UNLESS OTHERWISE NOTED.
18. WHERE STEEL MEMBERS BEAR IN CONCRETE OR MASONRY WALLS, OPENINGS SHALL BE DRY-PACKED AFTER STEEL IS IN PLACE.
19. PROVIDE SHOP DRAWINGS INDICATING SIZES, SPACING AND LOCATION OF JOISTS, GIRDERS, CONNECTIONS, BRIDGING, REINFORCING, ANCHORAGES, CAMBERS, AND LOADS. INDICATE WELDING CONNECTIONS USING STANDARD AWS WELDING SYMBOLS. INDICATE NEW WELD LENGTHS. INDICATE RECOMMENDED PROCEDURES FOR JOIST SEATS WITH INSUFFICIENT BEARING.

GENERAL STUCTURAL STEEL NOTES — A1

NTS

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CAPITAL PROJECTS DIVISION

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SEAL & SIGNATURE

LICENSED ARCHITECT — ROBINA R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

TYPICAL STRUCTURAL DETAILS

SCALE: As indicated

S-102

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY: Author	CHECKED BY: Checker

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TABLE R602.3(2) ALTERNATE ATTACHMENTS TO TABLE R602.3(1)

NOMINAL MATERIAL THICKNESS (inches)	DESCRIPTION[a,b] OF FASTENER AND LENGTH (inches)	SPACING[c] OF FASTENERS: EDGES (inches)	SPACING[c] OF FASTENERS: INTERMEDIATE SUPPORTS (inches)
WOOD STRUCTURAL PANELS SUBFLOOR, ROOF AND WALL SHEATHING TO FRAMING AND PARTICLEBOARD WALL SHEATHING TO FRAMING[j]			
UP TO 1/2	STAPLE 15 GA. 13/4	4	8
	0.097 - 0.099 NAIL 21/4	3	6
	STAPLE 16 GA. 13/4	3	6
19/32 AND 5/8	0.113 NAIL 2	3	6
	STAPLE 15 AND 16 GA. 2	4	8
	0.097 - 0.99 NAIL 21/4	4	8
23/32 AND 3/4	STAPLE 14 GA. 2	4	8
	STAPLE 15 GA. 13/4	3	6
	0.097 - 0.099 NAIL 21/4	4	8
	STAPLE 16 GA. 2	4	8
I	STAPLE 14 GA. 21/4	4	8
	0.113 NAIL 21/4	3	6
	STAPLE 15 GA. 21/4	4	8
	0.097 - 0.099 NAIL 21/2	4	8

NOMINAL MATERIAL THICKNESS (inches)	DESCRIPTION[a,b] OF FASTENER AND LENGTH (inches)	SPACING[c] OF FASTENERS: EDGES (inches)	SPACING[c] OF FASTENERS: BODY OF PANEL[d] (inches)
FLOOR, UNDERLAYMENT; PLYWOOD-HARDBOARD-PARTICLEBOARD[f]-FIBER-CEMENT[h]			
FIBER-CEMENT			
1/4	3D, CORROSION-RESISTANT, RING SHANK NAILS (FINISHED FLOORING OTHER THAN TILE)	3	6
	STAPLE 18 GA., 7/8 LONG, 1/4 CROWN (FINISHED FLOORING OTHER THAN TILE)	3	6
	1 1/4 LONG X .121 SHANK x .375 HEAD DIAMETER CORROSION-RESISTANT (GALVANIZED OR STAINLESS STEEL) ROOFING NAILS (FOR TILE FINISH)	8	8
	1 1/4 LONG, NO. 8 x .375 HEAD DIAMETER, RIBBED WAFER- HEAD SCREWS (FOR TILE FINISH)	8	8
PLYWOOD			
1/4 AND 5/16	1 1/4 RING OR SCREW SHANK NAIL-MINIMUM 12 1/2 GA. (0.099") SHANK DIAMETER	3	6
	STAPLE 18 GA., 7/8, 3/16 CROWN WIDTH	2	5
11/32, 3/8, 15/32, AND 1/2	1 1/4 RING OR SCREW SHANK NAIL-MINIMUM 12 1/2 GA. (0.099") SHANK DIAMETER	6	8[e]
19/32, 5/8, 23/32 AND 3/4	1 1/2 RING OR SCREW SHANK NAIL-MINIMUM 12 1/2 GA. (0.099") SHANK DIAMETER	6	8
	STAPLE 16 GA. 1 1/2	6	8
HARDBOARD[f]			
0.200	1 1/2 LONG RING- GROOVED UNDERLAYMENT NAIL	6	6
	4D CEMENT-COATED SINKER NAIL	6	6
	STAPLE 18 GA., 7/8 LONG (PLASTIC COATED)	3	6
PARTICLEBOARD			
1/4	4D RING-GROOVED UNDERLAYMENT NAIL	3	6
	STAPLE 18 GA., 7/8 LONG, 3/16 CROWN	3	6
3/8	6D RING-GROOVED UNDERLAYMENT NAIL	6	10
	STAPLE 16 GA., 1 1/8 LONG, 3/8 CROWN	3	6
1/2, 5/8	6D RING-GROOVED UNDERLAYMENT NAIL	6	10
	STAPLE 16 GA., 1 5/8 LONG, 3/8 CROWN	3	6

FOR SI: 1 inch = 25.4 mm.

a. NAIL IS A GENERAL DESCRIPTION AND SHALL BE PERMITTED TO BE T-HEAD, MODIFIED ROUND HEAD OR ROUND HEAD.
b. STAPLES SHALL HAVE A MINIMUM CROWN WIDTH OF 7/16-INCH ON DIAMETER EXCEPT AS NOTED.
c. NAILS OR STAPLES SHALL BE SPACES AT NOT MORE THAN 6 INCHES IN CENTER AT ALL SUPPORTS WHERE SPANS ARE 48 INCHES OR GREATER. NAILS OR STAPLES SHALL BE SPACED AT NOT MORE THAN 12 INCHES ON CENTER AT INTERMEDIATE SUPPORTS FOR FLOORS.
d. FASTENERS SHALL BE PLACE IN A GRID PATTERN THROUGHOUT THE BODY OF THE PANEL.
e. FOR 5-PLY PANELS, INTERMEDIATE NAILS SHALL BE SPACED NOT MORE THAN 12 INCHES ON CENTER EACH WAY.
f. HARDBOARD UNDERLAYMENT SHALL CONFORM TO CPA/ANSI A135.4
g. SPECIFIED ALTERNATE ATTACHMENTS FOR ROOF SHEATHING SHALL BE PERMITTED WHERE THE ULTIMATE DESIGN WIND SPEED IS LESS THAN 130 MPH. FASTENERS ATTACHING WOOD STRUCTURAL PANEL ROOF SHEATHING TO GABLE END WALL FRAMING SHALL BE INSTALLED USING THE SPACING LISTED FOR PANEL EDGES.
h. FIBER-CEMENT UNDERLAYMENT SHALL CONFORM TO ASTM C 1288 OR ISO 8336, CATEGORY C.

TABLE R702.3.5 MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD AND GYPSUM PANEL PRODUCTS

THICKNESS OF GYPSUM BOARD OR GYPSUM PANEL PRODUCTS (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD OR GYPSUM PANEL PRODUCT TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches O.C.)	MAXIMUM SPACING OF FASTENERS (inches): NAILS[a]	MAXIMUM SPACING OF FASTENERS (inches): SCREWS	SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING[c]
APPLICATION WITHOUT ADHESIVE						
3/8	CEILING[d]	PERPENDICULAR	16	7	12	13 GAGE, 1 1/4" LONG, 19/64" HEAD; 0.098" DIAMETER, 1 1/4" LONG, ANNULAR-RINGED; OR 4d COOLER NAIL, 0.080" DIAMETER, 13/8" LONG, 7/32" HEAD.
	WALL	EITHER DIRECTION	16	8	16	
1/2	CEILING	EITHER DIRECTION	16	7	12	13 GAGE, 13/8" LONG, 19/64" HEAD; 0.098" DIAMETER, 1 1/4" LONG, ANNULAR-RINGED; OR 5d COOLER NAIL, 0.086" DIAMETER, 15/8" LONG, 15/64" HEAD; OR GYPSUM BOARD NAIL, 0.086" DIAMETER, 15/8" LONG, 9/32" HEAD.
	CEILING[d]	PERPENDICULAR	24	7	12	
	WALL	EITHER DIRECTION	24	8	12	
	WALL	EITHER DIRECTION	16	8	16	
5/8	CEILING	EITHER DIRECTION	16	7	12	13 GAGE, 15/8" LONG, 19/64" HEAD; 0.098" DIAMETER, 13/8" LONG, ANNULAR-RINGED; OR 6d COOLER NAIL, 0.092" DIAMETER, 17/8" LONG, 1/4" HEAD; OR GYPSUM BOARD NAIL, 0.0915" DIAMETER, 17/8" LONG, 19/64" HEAD.
	CEILING	PERPENDICULAR	24	7	12	
	TYPE X AT GARAGE BENEATH HABITABLE ROOMS	PERPENDICULAR	24	6	6	17/8" LONG 6d COATED NAILS OR EQUIVALENT DRYWALL SCREWS. SCREWS SHALL COMPLY WITH SECTION R702.3.5.1
	WALL	EITHER DIRECTION	24	8	12	13 GAGE, 15/8" LONG, 19/64" HEAD; 0.098" DIAMETER, 13/8" LONG, ANNULAR-RINGED; 6d COOLER NAIL, 0.092" DIAMETER, 17/8" LONG, 1/4" HEAD; OR GYPSUM BOARD NAIL, 0.0915" DIAMETER, 17/8" LONG, 19/64" HEAD.
	WALL	EITHER DIRECTION	16	8	16	
APPLICATION WITH ADHESIVE						
3/8	CEILING[d]	PERPENDICULAR	16	16	16	SAME AS ABOVE FOR 3/8" GYPSUM BOARD AND GYPSUM BOARD AND GYPSUM PANEL PRODUCTS.
	WALL	EITHER DIRECTION	16	16	24	
1/2 OR 5/8	CEILING	EITHER DIRECTION	16	16	16	SAME AS ABOVE FOR 1/2" AND 5/8" GYPSUM BOARD AND GYPSUM PANEL PRODUCTS, RESPECTIVELY
	CEILING[d]	PERPENDICULAR	24	12	16	
	WALL	EITHER DIRECTION	24	16	24	
TWO 3/8 LAYERS	CEILING	PERPENDICULAR	16	16	16	BASE PLY NAILED AS ABOVE FOR 1/2" GYPSUM BOARD AND GYPSUM PANEL PRODUCTS; FACE PLY INSTALLED WITH ADHESIVE.
	WALL	EITHER DIRECTION	24	24	24	

FOR SI: 1 inch = 25.4 mm.

a. FOR APPLICATION WITHOUT ADHESIVE, A PAIR OF NAILS SPACED NOT LESS THAN 2 INCHES APART OR MORE THAN 2 1/2 INCHES APART SHALL BE PERMITTED TO BE USED WITH THE PAIR OF NAILS SPACED 12 INCHES ON CENTER.
b. SCREWS SHALL BE IN ACCORDANCE WITH SECTION R702.3.5.1. SCREWS FOR ATTACHING GYPSUM BOARD OR GYPSUM PANEL PRODUCTS TO STRUCTURAL INSULATED PANELS SHALL PENETRATE THE WOOD STRUCTURAL PANEL FACING NOT LESS THAN 7/16 INCH.
c. WHERE COLD FORMED STEEL FRAMING IS USED WITH A CLINCHING DESIGN TO RECEIVE NAILS BY TWO EDGES OF METAL, THE NAILS SHALL BE NOT LESS THAN 5/8 INCH LONGER THAN THE GYPSUM BOARD OR GYPSUM PANEL PRODUCT THICKNESS AND SHALL HAVE RINGED SHANKS. WHERE THE COLD-FORMED STEEL FRAMING HAS A NAILING GROOVE FORMED TO RECEIVE THE NAILS, THE NAILS SHALL HAVE BARBED SHANKS OR BE 5D, 13 1/2 GAGE, 15/8 INCHES LONG, 15/64-INCH HEAD FOR 1/2-INCH GYPSUM BOARD OR GYPSUM PANEL PRODUCT; AND 6D, 13 GAGE, 17/8 INCHES LONG, 15/64-INCH HEAD FOR 5/8-INCH GYPSUM BOARD OR GYPSUM PANEL PRODUCT.
d. THREE-EIGHTHS-INCH-THICK SINGLE-PLY GYPSUM BOARD OR GYPSUM PANEL PRODUCT SHALL NOT BE USE ON A CEILING WHERE A WATER-BASED TEXTURED FINISH IS TO BE APPLIED, OR WHERE IT WILL BE REQUIRED TO SUPPORT INSULATION ABOVE A CEILING, ON CEILING APPLICATIONS TO RECEIVE A WATER-BASED TEXTURE MATERIAL, EITHER HAND OR SPRAY APPLIED, THE GYPSUM BOARD OR GYPSUM PANEL PRODUCT SHALL BE APPLIED PERPENDICULAR TO FRAMING. WHERE APPLYING A WATER-BASED TEXTURE MATERIAL, THE MINIMUM GYPSUM BOARD THICKNESS SHALL BE INCREASED FROM 3/8 INCH TO 1/2 INCH FOR 16-INCH ON CENTER FRAMING, AND FROM 1/2 INCH TO 5/8 INCH FOR 24-INCH ON CENTER FRAMING OR 1/2-INCH SAG-RESISTANT GYPSUM CEILING BOARD SHALL BE USED.

TABLE R602.3(3) REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES

MINIMUM NAIL: SIZE	MINIMUM NAIL: PENETRATION (inches)	MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING: EDGES (inches o.c.)	PANEL NAIL SPACING: FIELD (inches o.c.)	PANEL NAIL SPACING: WIND EXPOSURE CATEGORY B	C	D
6d COMMON (2.0" x 0.113")	1.5	24/0	3/8	3/8	16	12	140	115	110
8d COMMON (2.5" x 0.131")	1.75	24/16	7/16	7/16	16	12	170	140	135
				7/16	24	12	140	115	110

FOR SI: 1 inch = 25.4 mm, 1 MILE PER HOUR = 0.447 m/s

a. PANEL STRENGTH AXIS PARALLEL OR PERPENDICULAR TO SUPPORTS. THREE-PLY PLYWOOD SHEATHING WITH STUDS SPACED MORE THAN 16 INCHES ON CENTER SHALL BE APPLIED WITH PANEL STRENGTH AXIS PERPENDICULAR TO SUPPORTS.

b. TABLE IS BASED ON WIND PRESSURES ACTING TOWARD AND AWAY FROM BUILDING SURFACES IN ACCORDANCE WITH SECTION R301.2. LATERAL BRACING REQUIREMENTS SHALL BE IN ACCORDANCE WITH SECTION R602.10.

c. WOOD STRUCTURAL PANELS WITH SPAN RATINGS OF WALL-16 OR WALL-24 SHALL BE PERMITTED AS AN ALTERNATE TO PANELS WITH A 24/0 SPAN RATING. PLYWOOD SIDING RATED 16 O.C. OR 24 O.C. SHALL BE PERMITTED AS AN ALTERNATE TO PANELS WITH A 24/16 SPAN RATING. WALL-16 AND PLYWOOD SIDING 16 O.C. SHALL BE USED WITH STUDS SPACED NOT MORE THAN 16 INCHES ON CENTER.

TABLE R602.3(4) ALLOWABLE SPANS FOR PARTICLE BOARD WALL SHEATHING

THICKNESS (inches)	GRADE	STUD SPACING (inches): WHEN SIDING IS NAILED TO STUDS	STUD SPACING (inches): WHEN SIDING IS NAILED TO SHEATHING
3/8	M-1 EXTERIOR GLUE	16	-----
1/2	M-2 EXTERIOR GLUE	16	16

FOR SI: 1 inch = 25.4 mm.

a. WALL SHEATHING NOT EXPOSED TO THE WEATHER. IF THE PANELS ARE APPLIED HORIZONTALLY, THE END JOINTS OF THE PANEL SHALL BE OFFSET SO THAT FOUR PANEL CORNERS WILL NOT MEET. ALL PANEL EDGES MUST BE SUPPORTED. LEAVE A 1/16-INCH GEP BETWEEN PANELS AND NAIL NOT LESS THAN 3/8 INCH FROM PANEL EDGES.

TABLE R602.3 (1) FASTENING SCHEDULE

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENERS[a,b,c]	SPACING AND LOCATION
1	BLOCKING BETWEEN CEILING JOIST OR RAFTERS TO TOP PLATE	4-8d BOX (2 1/2" x 0.113") OR 3-8d COMMON (2 1/2" x 0.131"); OR 3-10d BOX (3" x 0.128"); OR 3-3" x 0.131 NAILS	TOE NAIL
2	CEILING JOIST TO TOP PLATE	4-8d BOX (2 1/2" x 0.113") OR 3-8d COMMON (2 1/2" x 0.131"); OR 3-10d BOX (3" x 0.128"); OR 3-3" x 0.131 NAILS	PER JOIST TOE NAIL
3	CEILING JOIST NOT ATTACHED TO PARALLERL RAFTERS, LAPS OVER PARTITION [SEE SECTION R802.31, R802.3.2 AND TABLE R802.5.1 (9)]	4-10d BOX (2 1/2" x 0.113") OR 3-16d COMMON (3 1/2" x 0.162"); OR 3-10d BOX (3" x 0.128"); OR 4-3" x 0.131 NAILS	FACE NAIL
4	CEILING JOIST ATTACHE TO PARALLEL RAFTER (HEEL JOINT) [SEE SECTION R802.31 AND R802.3.2 AND TABLE R802.5.1 (9)]	TABLE R802.51 (9)	FACE NAIL
5	COLLAR TIE TO RAFTER, FACE NAIL OR 1 1/4" x 20ga. RIDGE STRAP TO RAFTER	4-10d BOX (3" x 0.128") OR 3-10d COMMON (3" x 0.148"); OR 4-3" x 0.131 NAILS	FACE NAIL EA. RAFTER
6	RAFTER OR ROOF TRUSS TO PLATE	3-16d BOX (3 1/2" x 0.135") OR 3-10d COMMON NAILS (3 1/2" x 0.148"); OR 4-10d BOX (3" x 0.128"); OR 4-3" x 0.131 NAILS	2 TOE NAILS ON ONE SIDE AND 1 TOE NAIL ON OPPOSITE SIDE OF EACH RAFTER OR TRUSS
7	ROOF RAFTERS TO RIDGE, VALLET OR HIP RAFTERS OR ROOF RAFTER TO MINIMUM 2" RIDGE BEAM	4-16d BOX (3 1/2" x 0.135") OR 3-10d COMMON NAILS (3 1/2" x 0.148"); OR 4-10d BOX (3" x 0.128"); OR 4-3" x 0.131 NAILS	TOE NAIL
		3-16d BOX (3 1/2" x 0.135") OR 3-16d COMMON (3 1/2" x 0.162"); OR 3-10d BOX (3" x 0.128"); OR 3-3" x 0.131" NAILS	END NAIL
WALL			
8	STUD TO STUD (NOT AT BRACED WALL PANELS)	16d COMMON (3 1/2" x 0.162")	24" O.C. FACE NAIL
		10d BOX (3" x 0.128"); OR 3" x 0.131" NAILS	16" O.C. FACE NAIL
9	STUD TO STUD AND ABUTTING STUDS AR INTERSECTING WALL CORNERS (AT BRACED WALL PANELS)	16d BOX (3 1/2" x 0.135"); OR 3" x 0.131" NAILS	12" O.C. FACE NAIL
		16d COMMON (3 1/2" x 0.162")	16" O.C. FACE NAIL
10	BUILT-IP HEADER (2" TO 2" HEADER WITH 1/2" SPACER)	16d COMMON (3 1/2" x 0.162")	16" O.C. EACH EDGE FACE NAIL
		16d BOX (3" x 0.135")	12" O.C. EACH EDGE FACE NAIL
11	CONTINUOUS HEADER TO STUD	5-8d BOX (2 1/2" x 0.113") OR 4-8d COMMON (2 1/2" x 0.131"); OR 4-10d BOX (3" x 0.128"	TOE NAIL
12	TOP PLATE TO TOP PLATE	16d COMMON (3 1/2" x 0.162")	16" O.C. FACE NAIL
		10d BOX (3" x 0.128"); OR 3" x 0.131" NAILS	12" O.C. FACE NAIL
13	DOUBLE TOP PLATE SPLICE FOR SDCs A-D2 WITH SEISMIC BRACED WALL LINE SPACING <25'	8-16d BOX (3 1/2" x 0.162") OR 12-16d BOX (3 1/2" x 0.135"); OR 12-10d BOX (3" x 0.128"); OR 12-3" x 0.131 NAILS	PER JOIST TOE NAIL
	DOUBLE TOP PLATE SPLICE FOR SDCs D0, D1, D2, AND BRACED WALL LINE SPACING >25'	12-16d (3 1/2" x 0.135")	FACE NAIL ON EACH SIDE OF END JOINT (MIN. 24" LAP SPLICE LENGTH EACH SIDE OF END JOINT)
14	BOTTOM PLATE TO JOIST, RIM JOIST, BAND JOIST OR BLOCKING (NOT AT BRACED WALL PANELS)	16d COMMON (3 1/2" x 0.162")	16" O.C. FACE NAIL
		16d BOX (3 1/2" x 0.135"); OR 3" x 0.131" NAILS	12" O.C. FACE NAIL
15	BOTTOM PLATE TO JOIST, RIM JOIST, BAND JOIST OR BLOCKING (NOT AT BRACED WALL PANELS)	16d BOX (3 1/2" x 0.135"); OR 3" x 0.131" NAILS	3" EA. 16" O.C. FACE NAIL 2" EA. 16" O.C. FACE NAIL 4" EA. 16" O.C. FACE NAIL
16	TOP OR BOTTOM PLATE TO STUD	4-8d BOX (2 1/2" x 0.113") OR 3-16d BOX (3 1/2" x 0.135"); OR 4-8d COMMON (2 1/2" x 0.131"); OR 4-10d BOX (3" x 0.128"); OR 4-3" x 0.131 NAILS	TOE NAIL
		3-16d BOX (3 1/2" x 0.135") OR 2-16d COMMON (3 1/2" x 0.162"); OR 3-10d BOX (3" x 0.128"); OR 3-3" x 0.131" NAILS	END NAIL
17	TOP PLATES, LAPS AT CORNERS AND INTERSECTIONS	3-10d BOX (3" x 0.128") OR 2-16d COMMON (3 1/2" x 0.162"); OR 3-3" x 0.131" NAILS	FACE NAIL
18	1" BRACE TO EACH STUD AND PLATE	3-8d BOX (2 1/2" x 0.113") OR 2-8d COMMON (2 1/2" x 0.113"); OR 2-10d BOX (3" x 0.128"); OR 2 STAPLES 1 3/4"	FACE NAIL
19	1" x6" SHEATHING TO EACH BEARING	3-8d BOX (2 1/2" x 0.113") OR 2-8d COMMON (2 1/2" x 0.113"); OR 2-10d BOX (3" x 0.128"); OR 2 STAPLES, 1" CROWN, 16ga. 1 3/4" LONG	FACE NAIL
20	1" x 8" WIDER SHEATHING TO EACH BEARING	3-8d BOX (2 1/2" x 0.113") OR 3-8d COMMON (2 1/2" x 0.113"); OR 3-10d BOX (3" x 0.128"); OR 3 STAPLES, 1" CROWN, 16ga. 1 3/4" LONG	FACE NAIL
		WIDER THAN 1" x 8" 4-8d BOX (2 1/2" x 0.113") OR 3-8d COMMON (2 1/2" x 0.131"); OR 3-10d BOX (3" x 0.128"); OR 4 STAPLES, 1" CROWN, 16ga. 1 3/4" LONG	

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENERS[a,b,c]	SPACING AND LOCATION
FLOOR			
21	JOIST TO SILL, TOP PLATE OR GIRDER	4-8d BOX (2 1/2" x 0.113") OR 3-8d COMMON (2 1/2" x 0.131"); OR 3-10d BOX (3" x 0.128"); OR 3-3" x 0.131 NAILS	TOE NAIL
22	RIM JOIST, BAND JOIST OR BLOCKING TO SILL OR TOP PLATE (ROOF APPLICATIONS ALSO)	8d BOX (2 1/2" x 0.131")	4" O.C. TOE NAIL
		8d COMMON (2 1/2" x 0.131") OR 10d BOX (3" x 0.128"); OR 3" x 0.131" NAILS	6" O.C. TOE NAIL
23	1" x 6" SUBFLOOR OR LESS TO EACH JOIST	3-8d BOX (2 1/2" x 0.113") OR 2-8d COMMON (2 1/2" x 0.131"); OR 3-10d BOX (3" x 0.128"); OR 2 STAPLES, 1" CROWN, 16ga. 1 3/4" LONG	FACE NAIL
24	2" SUBFLOOR TO JOIST OR GIRDER	3-16d BOX (3" x 0.135") OR 2-16d COMMON (3 1/2" x 0.162")	BLIND AND FACE NAIL
25	2" PLANKS (PLANK & BEAM - FLOOR & ROOF)	3-16d BOX (3" x 0.135") OR 2-16d COMMON (3 1/2" x 0.162")	AT EACH BEARING FACE NAIL
26	BAND OR RIM JOIST TO JOIST	3-16d COMMON (3 1/2" x 0.162") OR 4-10d BOX (3" x 0.128"); OR 4-3 x 0.131" NAILS; OR 4-3 x 14ga. STAPLES, 7/16" CROWN	END NAIL
27	BUILT-UP GIRDERS AND BEAMS, 2" LUMBER LAYERS	20d COMMON (4" x 0.192")	NAIL EACH LAYER AS FOLLOWS: 32" O.C. AT TOP AND BOTTOM AND STAGGERED
		10d BOX (3" x 0.128"); OR 3" x 0.131" NAILS	24" O.C. FACE NAIL AT TOP AND BOTTOM STAGGERED ON OPPOSITE SIDES
		AND 2-20d COMMON (4" x 0.192"); OR 3-10d BOX (3" x 0.128"); OR 3-3" x 0.131" NAILS	FACE NAIL AT ENDS AND AT EACH SPLICE
28	LEDGER STRIP SUPPORTING JOISTS OR RAFTERS	4-16d BOX (3 1/2" x 0.135") OR 3-16d COMMON (3 1/2" x 0.162"); OR 4-10d BOX (3" x 0.128"); OR 4-3 x 0.131" NAILS	AT EACH JOIST OR RAFTER, FACE NAIL
29	BRIDGING TO JOIST	2-10d (3" x 0.128")	EACH END, TOE NAIL

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENERS[a,b,c]	SPACING OF FASTENERS: EDGES (inches)	SPACING OF FASTENERS: INTERMEDIATE SUPPORTS (inches)
WOOD STRUCTURAL PANELS, SUBFLOOR, ROOF AND INTERIOR WALL SHEATHING TO FRAMING AND PARTICLE BOARD WALL SHEATHING TO FRAMING (SEE TABLE R602.3(3) FOR WOOD STRUCTURAL PANEL EXTERIOR WALL SHEATHING TO WALL FRAMING)				
30	3/8" - 1/2"	6d COMMON (2" x 0.113") NAIL (SUBFLOOR, WALL) 8d COMMON (2 1/2" x 0.131") NAIL (ROOF)	6"	12"
31	10/32" - 1"	8d COMMON NAIL (2 1/2" x 0.131")	6"	12"
32	1 1/8" - 1 1/4"	10d COMMON NAIL (3" x 0.148") NAIL; OR 8d (2 1/2" x 0.131") NAIL (ROOF)	6"	12"
OTHER WALL SHEATHING				
33	1/2" STRUCTURAL CELLULOSIC FIBERBOARD SHEATHING	1 1/2" GALVANIZED ROOFING NAIL, 7/16" HEAD DIAMETER, OR 1" CROWN STAPLE 16ga. 1 1/4" LONG	3"	6"
34	25/32" STRUCTURAL CELLULOSIC FIBERBOARD SHEATHING	1 3/4" GALVANIZED ROOFING NAIL, 7/16" HEAD DIAMETER, OR 1" CROWN STAPLE 16ga. 1 1/4" LONG	3"	6"
35	1/2" GYPSUM SHEATHING	1 1/2" GALVANIZED ROOFING NAIL, STAPLE GALVANIZED 1 1/2" LONG, 1 1/4" SCREWS, TYPE W OR S	7"	7"
36	5/8" GYPSUM SHEATHING	1 3/4" GALVANIZED ROOFING NAIL, STAPLE GALVANIZED 1 5/8" LONG, 1 5/8" SCREWS, TYPE W OR S	7"	7"
WOOD STRUCTURAL PANELS, COMBINATION SUBFLOOR UNDER LAYMENT TO FRAMING				
37	3/4" AND LESS	6d DEFORMED (2" x 0.120") NAIL; OR 8d COMMON (2 1/2" x 0.131") NAIL	6"	12"
38	7/8" - 1"	8d COMMON (2 1/2" x 0.131") NAIL; OR 8d DEFORMED (2 1/2" x 0.120") NAIL	6"	12"
39	1 1/8" - 1 1/4"	10d COMMON (3" x 0.148") NAIL; OR 8d DEFORMED (2 1/2" x 0.120") NAIL	6"	12"

FOR SI: 1 inch = 25.4 mm, 1 FOOT = 304.8mm, 1 MILE PER HOUR = 0.447 m/s; KSI = 6.895 Mpa.

a. NAILS ARE SMOOTH-COMMON, BOX OR DEFORMED SHANKS EXCEPT WHERE OTHERWISE STATED. NAILS USED FOR FRAMING AND SHEATHING CONNECTIONS SHALL HAVE MINIMUM AVERAGE BENDING YIELD STRENGTHS AS SHOWNI: 80 KSI FOR SHANK DIAMETER OF 0.192 INCH (20d COMMON NAIL), 90 KSI FOR SHANK DIAMETERS LARGER THAN 0.142 INCH BUT NOT LARGER THAN 0.177 INCH, AND 100 KSI FOR SHANK DIAMETERS OF 0.142 INCH OR LESS.
b. STAPLES ARE 16 GAGE WIRE AND HAVE A MINIMUM 7/16-INCH ON DIAMETER CROWN WIDTH.
c. NAILS SHALL BE SPACED AT NOT MORE THAN 6 INCHES ON CENTER AT ALL SUPPORTS WHERE SPANS ARE 48 INCHES OR GREATER.
d. FOUR-FOOT BY 8-FOOT OR 4-FOOT BY 9-FOOT PANELS SHALL BE APPLIED VERTICALLY.
e. SPACING OF FASTENERS NOT INCLUDED IN THIS TABLE SHALL BE BASED ON TABLE R602.3(2).
f. WHERE THE ULTIMATE DESIGN WIND SPEED IS 130 MPH OR LESS, NAILS FOR ATTACHING WOOD STRUCTURAL PANEL ROOF SHEATHING TO GABLE END WALL FRAMING SHALL BE SPACED 6 INCHES ON CENTER. WHERE THE U;TIMATE DESIGN WIND SPEED IS GREATER THAN 130 MPH, NAILS FOR ATTACHING PANEL ROOF SHEATHING TO INTERMEDIATE SUPPORTS SHALL BE SPACED 6 INCHES ON CENTER FOR MINIMUM 48-INCH DISTANCE FROM RIDGES, EAVES AND GABLE END WALLS; AND 4 INCH ON CENTER TO GABLE END WALL FRAMING.
g. GYPSUM SHEATHING SHALL CONFORM TO ASTM C 1396 AND SHALL BE INSTALLED IN ACCORDANCE WITH GA 253. FIBERBOARD SHEATHING SHALL CONFORM TO ASTM C 208.
h. SPACING OF FASTENERS ON FLOOR SHEATHING PANEL EDGES APPLIES TO PANEL EDGES SUPPORTED BY FRAMING MEMBERS AND REQUIRED BLOCKING AND AT ALL FLOOR PERIMETERS ONLY. SPACING OF FASTENERS ON ROOF SHEATHING PANEL EDGES APPLIES TO PANEL EDGES SUPPORTED BY FRAMING MEMBERS AND REQUIRED BLOCKING. BLOCKING OF ROOF OR FLOOR SHEATHING PANEL EDGES PERPENDICULAR TO THE FRAMING MEMBERS NEED NOT BE PROVIDED EXCEPT AS REQUIRED BY OTHER PROVISIONS OF THIS CODE. FLOOR PERIMETER SHALL BE SUPPORTED BY FRAMING MEMBERS OR SOLID BLOCKING.
i. WHERE A RAFTER IS FASTENED TO AN ADJACENT PARALLEL CEILING JOIST IN ACCORDANCE WITH THIS SCHEDULE, PROVIDE TWO TOE NAILS ON ONE SIDE OF THE RAFTER AND TOE NAILS FROM THE CEILING JOIST TO TOP PLATE IN ACCORDANCE WITH THIS SCHEDULE. THE TOE NAIL ON THE OPPOSITE SIDE OF THE RAFTER SHALL NOT BE REQUIRED.

TABLE R602.3 (2) SINGLE TOP-PLATE SPLICE CONNECTION DETAILS

CONDITION	TOP - PLATE SPLICE CONNECTION DETAILS: CORNERS AND INTERSECTING: SPLICE PLATE SIZE	CORNERS AND INTERSECTING: MINIMUM NAILS EACH SIDE OF JOINT	BUTT JOINTS IN A STRAIGHT WALL: SPLICE PLATE SIZE	BUTT JOINTS IN A STRAIGHT WALL: MINIMUM NAILS EACH SIDE OF JOINT
STRUCTURE IN SDC D0, D1A AND D2, WITH BRACED WALL LINE SPACING GREATER THAN OR EQUAL TO 25 FEET	3" x 6" x 0.036" GALVANIZED STEEL PLATE OR EQUIVALENT	(6) 8d BOX (2 1/2" x 0.113") NAILS	3" x 12" x 0.036" GALVANIZED STEEL PLATE OR EQUIVALENT	(12) 8d BOX (2 1/2" x 0.113") NAILS
STRUCTURE IN SDC A-C; AND IN SDC D0, D1 AND D2 WITH BRACED WALL LINE SPACING LESS THAN 25 FEET	3" x 8" x 0.036" GALVANIZED STEEL PLATE OR EQUIVALENT	(9) 8d BOX (2 1/2" x 0.113") NAILS	3" x 16" x 0.036" GALVANIZED STEEL PLATE OR EQUIVALENT	(18) 8d BOX (2 1/2" x 0.113") NAILS

FOR SI: 1 inch = 25.4 mm, 1 FOOT = 304.8 mm.

DUPLEX DWELLING UNIT

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PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

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LICENSED ARCHITECT ROBIN A. R. WRIGHT NO. C-32283 RENEWAL DATE 06/30/2025 STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

FASTENING SCHEDULE (RESIDENTIAL)

SCALE 12" = 1'-0"

S-103

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY: Author	CHECKED BY: Checker

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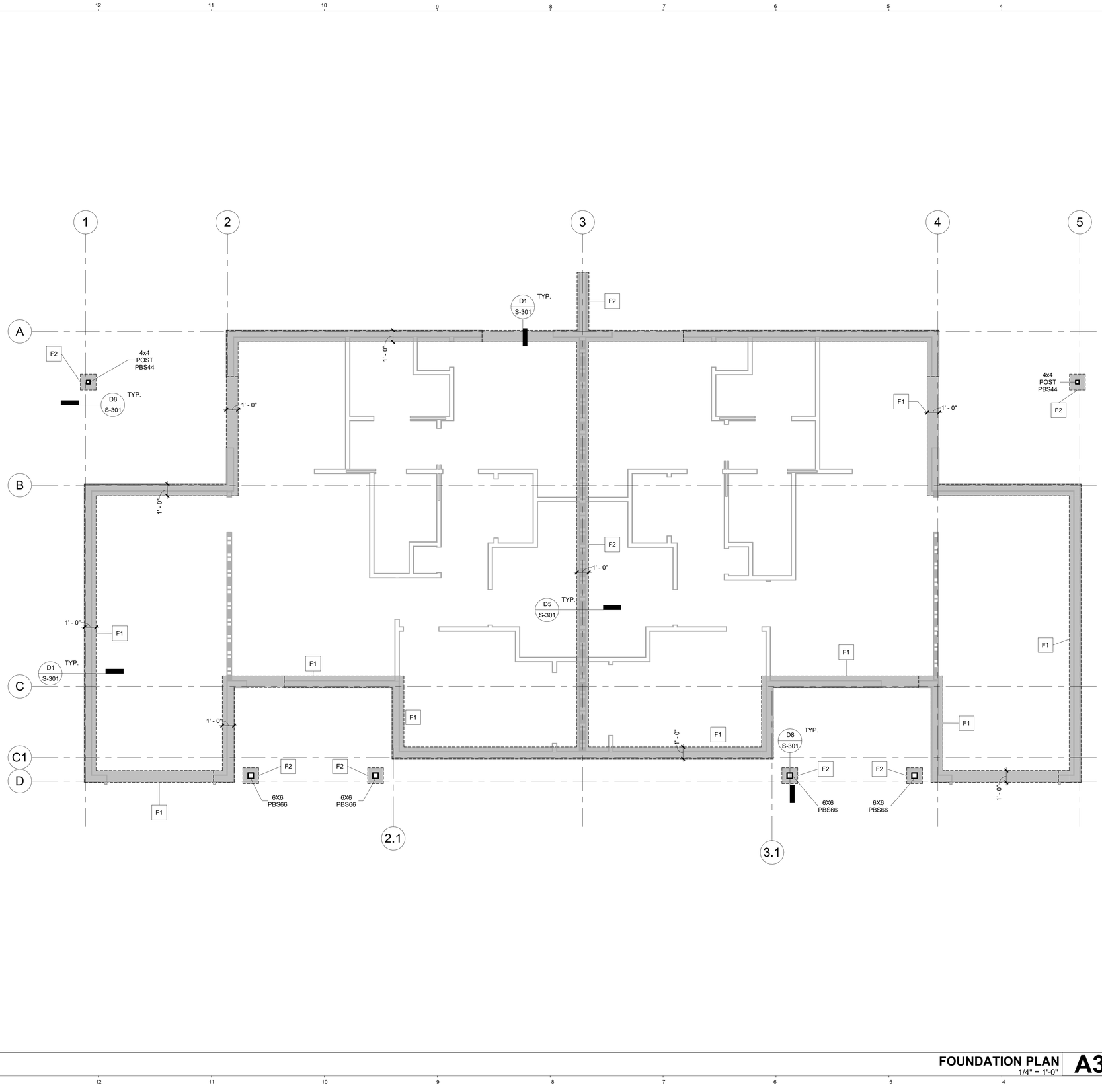
24" X 36"



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

A3

GENERAL NOTES

R401.4.1.1 GENERAL AND WHERE REQUIRED FOR APPLICATIONS LISTED IN SECTION 1.8.2.1.1 REGULATED BY THE DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT FOUNDATIONS AND SOILS INVESTIGATIONS SHALL BE CONDUCTED IN CONFORMANCE WITH HEALTH AND SAFETY CODE SECTIONS 17953 THROUGH 17957 AS SUMMARIZED BELOW.

R401.4.1.1.1 PRELIMINARY SOIL REPORT
EACH CITY, COUNTY, OR CITY AND COUNTY SHALL ENACT AN ORDINANCE WHICH REQUIRES A PRELIMINARY SOIL REPORT, PREPARED BY A CIVIL ENGINEER WHO IS REGISTERED BY THE STATE. THE REPORT SHALL BE BASED UPON ADEQUATE TEST BORINGS OR EXCAVATIONS, OF EVERY SUBDIVISION, WHERE A TENTATIVE AND FINAL MAP IS REQUIRED PURSUANT TO SECTION 66426 OF THE GOVERNMENT CODE.
THE PRELIMINARY SOIL REPORT MAY BE WAIVED IF THE BUILDING DEPARTMENT OF THE CITY, COUNTY OR CITY AND COUNTY, OR OTHER ENFORCEMENT AGENCY CHARGED WITH THE ADMINISTRATION AND ENFORCEMENT OF THE PROVISIONS OF SECTION R401.4.1.1, SHALL DETERMINE THAT, DUE TO THE KNOWLEDGE SUCH DEPARTMENT HAS AS TO THE SOIL QUALITIES OF THE SOIL OF THE SUBDIVISION OR LOT, NO PRELIMINARY ANALYSIS IS NECESSARY.

R401.4.1.1.2 SOIL INVESTIGATION BY LOT, NECESSITY, PREPARATION AND RECOMMENDATIONS
IF THE PRELIMINARY SOIL REPORT INDICATES THE PRESENCE OF CRITICALLY EXPANSIVE SOILS OR OTHER SOIL PROBLEMS WHICH, IF NOT CORRECTED, WOULD LEAD TO STRUCTURAL DEFECTS, SUCH ORDINANCE SHALL REQUIRE A SOIL INVESTIGATION OF EACH LOT IN THE SUBDIVISION. THE SOIL INVESTIGATION SHALL BE PREPARED BY A CIVIL ENGINEER WHO IS REGISTERED IN THIS STATE. IT SHALL RECOMMEND CORRECTIVE ACTION WHICH IS LIKELY TO PREVENT STRUCTURAL DAMAGE TO EACH DWELLING PROPOSED TO BE CONSTRUCTED ON THE EXPANSIVE SOIL.

R401.4.1.1.3 APPROVAL, BUILDING PERMIT CONDITIONS, APPEAL
THE BUILDING DEPARTMENT OF EACH CITY, COUNTY OR CITY AND COUNTY, OR OTHER ENFORCEMENT AGENCY CHARGED WITH THE ADMINISTRATION AND ENFORCEMENT OF THE PROVISIONS OF THIS CODE, SHALL APPROVE THE SOIL INVESTIGATION IF IT DETERMINES THAT THE RECOMMENDED ACTION IS LIKELY TO PREVENT STRUCTURAL DAMAGE TO EACH DWELLING TO BE CONSTRUCTED. AS A CONDITION TO THE BUILDING PERMIT, THE ORDINANCE SHALL REQUIRE THAT THE APPROVED RECOMMENDED ACTION BE INCORPORATED IN THE CONSTRUCTION OF EACH DWELLING. APPEAL FROM SUCH DETERMINATION SHALL BE TO THE LOCAL APPEALS BOARD.

R401.4.1.1.4 LIABILITY
A CITY, COUNTY, OR CITY AND COUNTY OR OTHER ENFORCEMENT AGENCY CHARGED WITH THE ADMINISTRATION AND ENFORCEMENT OF THE PROVISIONS OF SECTION R401.4.1.1, IS NOT LIABLE FOR ANY INJURY WHICH ARISES OUT OF ANY ACT OR OMISSION OF THE CITY, COUNTY OR CITY AND COUNTY, OR OTHER ENFORCEMENT AGENCY, OR A PUBLIC EMPLOYEE OR ANY OTHER PERSON UNDER SECTION R401.4.1.1.1, R401.4.1.1.2 OR R401.4.1.1.3.

R401.4.1.1.5 ALTERNATE PROCEDURES
THE GOVERNING BODY OF ANY CITY, COUNTY, OR CITY AND COUNTY MAY ENACT AN ORDINANCE PRESCRIBING AN ALTERNATE PROCEDURE WHICH IS EQUAL TO OR MORE RESTRICTIVE THAN THE PROCEDURES SPECIFIED IN SECTIONS R401.4.1.1.1, R401.4.1.1.2 AND R401.1.1.3.

R401.4.2 COMPRESSIBLE OR SHIFTING SOIL
INSTEAD OF A COMPLETE GEOTECHNICAL EVALUATION, WHERE TOP OR SUBSOILS ARE COMPRESSIBLE OR SHIFTING, THEY SHALL BE REMOVED TO A DEPTH AND WIDTH SUFFICIENT TO ENSURE STABLE MOISTURE CONTENT IN EACH ACTIVE ZONE AND SHALL NOT BE USED AS FILL OR STABILIZED WITHIN EACH ACTIVE ZONE BY CHEMICAL, DEWATERING OR PRESATURATION.

FOUNDATION NOTES

1. THE CONTRACTOR MUST READ & UNDERSTAND ALL STANDARDS NOTES & DETAILS BEFORE BEGINNINGS CONSTRUCTION OR FABRICATION.
2. ALL UNCLEAR AND / OR MISSING DETAILS OR INFO. SHALL BE BROUGHT TO THE ENGINEER IS ATTENTION BEFORE PROCEEDING N/ CONSTRUCTION.
3. ALL CONCRETE PLACEMENT SHALL MEET WITH THE 2022 CALIFORNIA BUILDING CODE REQUIREMENTS.
4. CONCRETE SHALL BE PROTECTED ADEQUATELY FROM INJURIOUS ACTION BY THE SUN, RAIN, WIND, FLOWING WATER, FROST AND MECHANICAL INURT, AND SHALL NOT BE ALLOWED TO DRY OUT FROM THE TIME IT IS PLACED UNTIL THE EXPIRATION OF THE MINIMUM CURING PERIOD. A FINE FOG SPRAY SHALL BE USED TO REDUCE PLASTIC SHRINKAGE CRACKS AFTER FINISHING OPERATIONS. IMMEDIATELY AFTER THE NET CONCRETE HAS BEEN BROUGHT TO A FLAT SURFACE AND THE SHINY SURFACE HAS DISAPPEARED, ADDITIONAL MOISTURE SHALL BE APPLIED TO RESTORE SHINE, USING AN ATOMIZING TYPE FOG SPRATER. FREQUENT LIGHT APPLICATION OF MOISTURE SHALL BE PROVIDED AS REQUIRED BY NEITHER CONDITIONS.
5. SLOPE ALL LANDINGS AND WALKWAYS AWAY FROM THE BUILDING.
6. FOUNDATION WALLS SHALL EXTEND AT LEAST 8" ABOVE THE FINISHED GRADE ADJACENT TO THE FOUNDATION AT ALL POINTS. FOR MASONRY OR CONCRETE CONSTRUCTION, THE MINIMUM FOUNDATION WALL WILL BE 6 INCHES.
7. WOOD SOLE PLATES AT ALL EXTERIOR WALLS ON MONOLITHIC SLABS, WOOD SOLE PLATES OF BRACED WALL PANELS AT BUILDING INTERIORS ON MONOLITHIC SLABS AND ALL WOOD SILL PLATES SHALL BE ANCHORED TO THE FOUNDATION WITH MINIMUM 1/2-INCH-DIAMETER ANCHOR BOLTS SPACED NOT GREATER THAN 6 FEET ON CENTER OR APPROVED ANCHORS OR ANCHOR STRAPS SPACED AS REQUIRED TO PROVIDE EQUIVALENT ANCHORAGE TO 1/2-INCH-DIAMETER ANCHOR BOLTS.
8. BOLTS SHALL EXTEND NOT LESS THAN 7 INCHES INTO CONCRETE OR GROUTED CELLS OF CONCRETE MASONRY UNITS. THE BOLTS SHALL BE LOCATED IN THE MIDDLE THIRD OF THE WIDTH OF THE PLATE. A NUT AND WASHER SHALL BE TIGHTENED ON EACH ANCHOR BOLT. THERE SHALL BE NOT FEWER THAN TWO BOLTS PER PLATE SECTION WITH ONE BOLT LOCATED NOT MORE THAN 12 INCHES OR LESS THAN SEVEN BOLT DIAMETERS FROM EACH END OF THE PLATE SECTION.
9. INTERIOR BEARING WALL SOLE PLATES ON MONOLITHIC SLAB FOUNDATION THAT ARE NOT PART OF A BRACED WALL PANEL SHALL BE POSITIVELY ANCHORED WITH APPROVED FASTENERS. SILL PLATES AND SOLE PLATES SHALL BE PROTECTED AGAINST DECAY AND TERMITES WHERE REQUIRED BY SECTIONS R317 AND R318. ANCHOR BOLTS SHALL BE PERMITTED TO BE LOCATED WHILE CONCRETE IS STILL PLASTIC AND BEFORE IT HAS SET. WHERE ANCHOR BOLTS RESIST PLACEMENT OR THE CONSOLIDATION OF CONCRETE AROUND ANCHOR BOLTS IS IMPEDED, THE CONCRETE SHALL BE VIBRATED TO ENSURE FULL CONTACT BETWEEN THE ANCHOR BOLTS AND CONCRETE.
10. ALL DISTURBED OR FILL SOIL UNDER CONCRETE SHALL BE COMPACTED TO A MINIMUM OF 90 % RELATIVE COMPACTION BASED ON ASTM STANDARD D1557, INCLUDING RETAINING WALL BACKFILL.
11. **CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND TO BRING ANY OMISSIONS OR DISCREPANCIES TO THE ATTENTION OF THE ENGINEER. *
12. HOLDDOWN HARDWARE MUST BE SECURED IN FACE PRIOR TO FOUNDATION INSPECTION
13. FINISH GRADE FOR THE FIRST I FT FROM THE FOUNDATION SHALL SLOPE MINIMUM OF 5% ON ALL SIDES. THIS INCLUDES ANY IMPERVIOUS SURFACES.
14. WOOD FRAMING MEMBERS THAT REST ON EXTERIOR FOUNDATION WALL AND ARE LESS THAN 8" FROM EXPOSED EARTH SHALL BE ON NATURALLY DURABLE OR PRESERVATIVE-TREATED WOOD.
15. PONDER DRIVEN FASTENERS SHALL NOT BE USED IN STEM WALLS LESS THAN 5 1/2" WIDE OR GREATER THAN 5 1/2" HIGH
16. THE FASTENERS AND CONNECTORS IN DIRECT CONTACT WITH PRESERVATIVE-TREATED WOOD SHALL BE HOT DIPPED ZING-COATED GALVANIZED STEEL, STAINLESS STEEL, SILICON BRONZE OR COPPER

FOOTING SCHEDULE

FOOTING ID	PAD SIZE	LUMBER GRADE			H
		# REQ'D	BAR #		inches
F1	1'-0" WIDE CONT. FOOTING	1	4	TOP & BOTTOM	12
F2	1' - 4" SQUARE	2	4		12

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DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

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LICENSED ARCHITECT
ROBINA R WRIGHT
NO. C-32283
RENEWAL DATE 06/30/2025
STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

FOUNDATION PLAN

SCALE As indicated

S-201

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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Author	Checker

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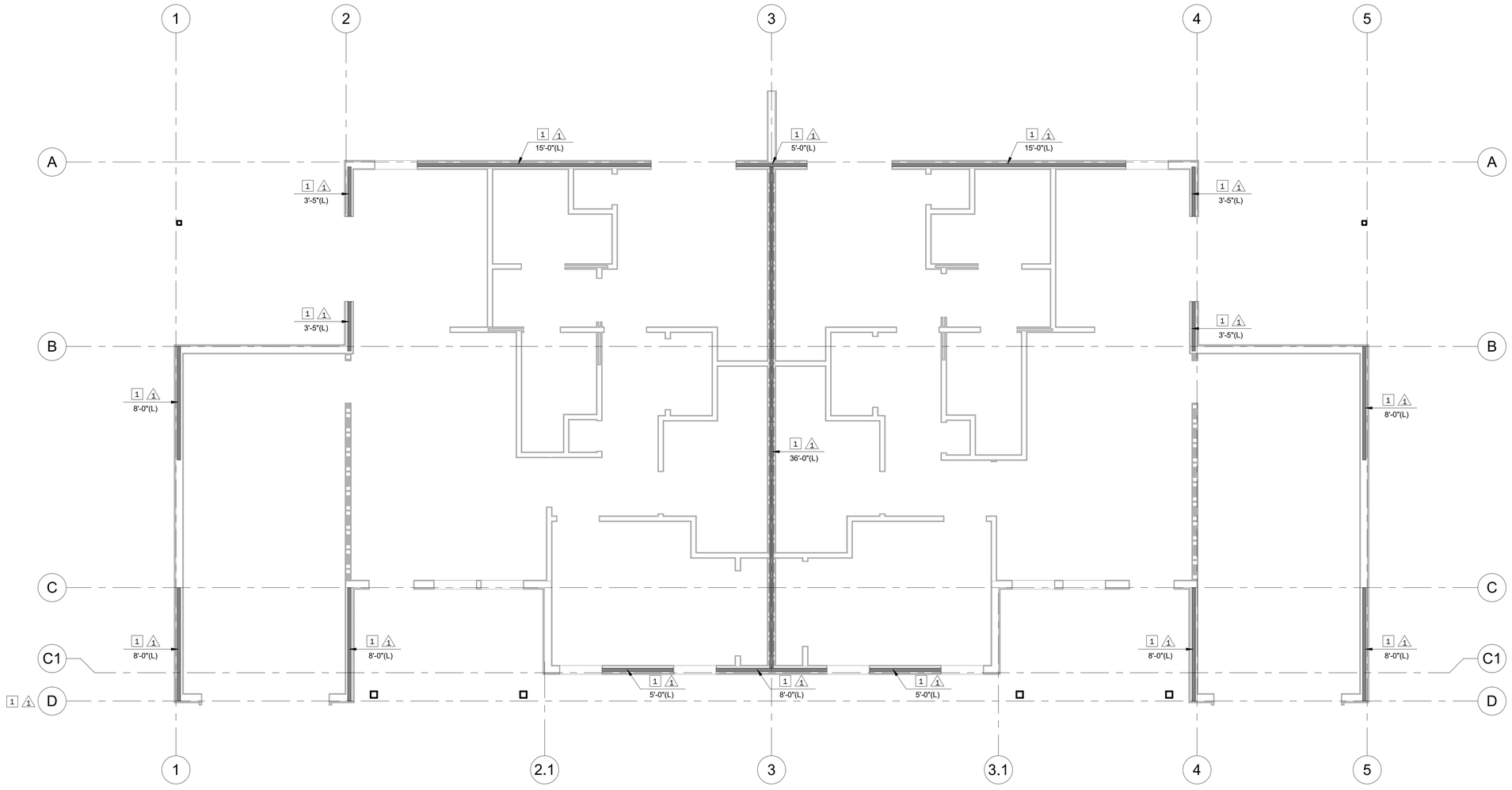
24" X 36"



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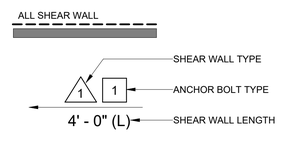

SHEAR WALL SCHEDULE			CAPACITY	
TYPE	SHEATHING	NAILING EN & FN	SEISMIC	WIND
1	3/8" APA STRUCTURAL PANEL 24/0 CDX or OSB	8D @ 6" O.C.	260 PLF	365 PLF
		8D @ 12" O.C.		

NOTE:
1. ALL PANEL EDGES TO BE BLKED UNO
2. NAILS TO BE COMMON NAILS UNO
3. **PROVIDE 3X OR DBL STUDS AT ADJOINING EDGES
4. ** STAGGER NAILS

ANCHOR BOLT SCHEDULE			
TYPE	ANCHOR BOLTS	ALLOWABLE LOADS (PLF)	
		2X SILL	3X SILL
1	1/2" Ø x10" @ 6'-0" o.c.	173	205

NOTE:
1. PROVIDE 3" SQX 0.299" WASHERS AT ANCHOR BOLTS
2. PROVIDE 2 AB MIN PER SHEAR WALL PANEL.
3. PROVIDE 7" MIN. EMBEDMENT IN CONCRETE.
4. SILL PLATES TO BE PRESSURE TREATED DF.
5. FASTENERS IN P.T. WOOD SHALL BE HOT-DIPPED ZINC-COATED GAL-STEEL.

SHEAR WALL PLAN 1/4" = 1'-0" **A1**

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24" X 36"

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PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

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JAN. 02, 2024

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TITLE

SHEAR WALL PLAN

SCALE As indicated

S-202

ISSUE DATE	JOB NUMBER
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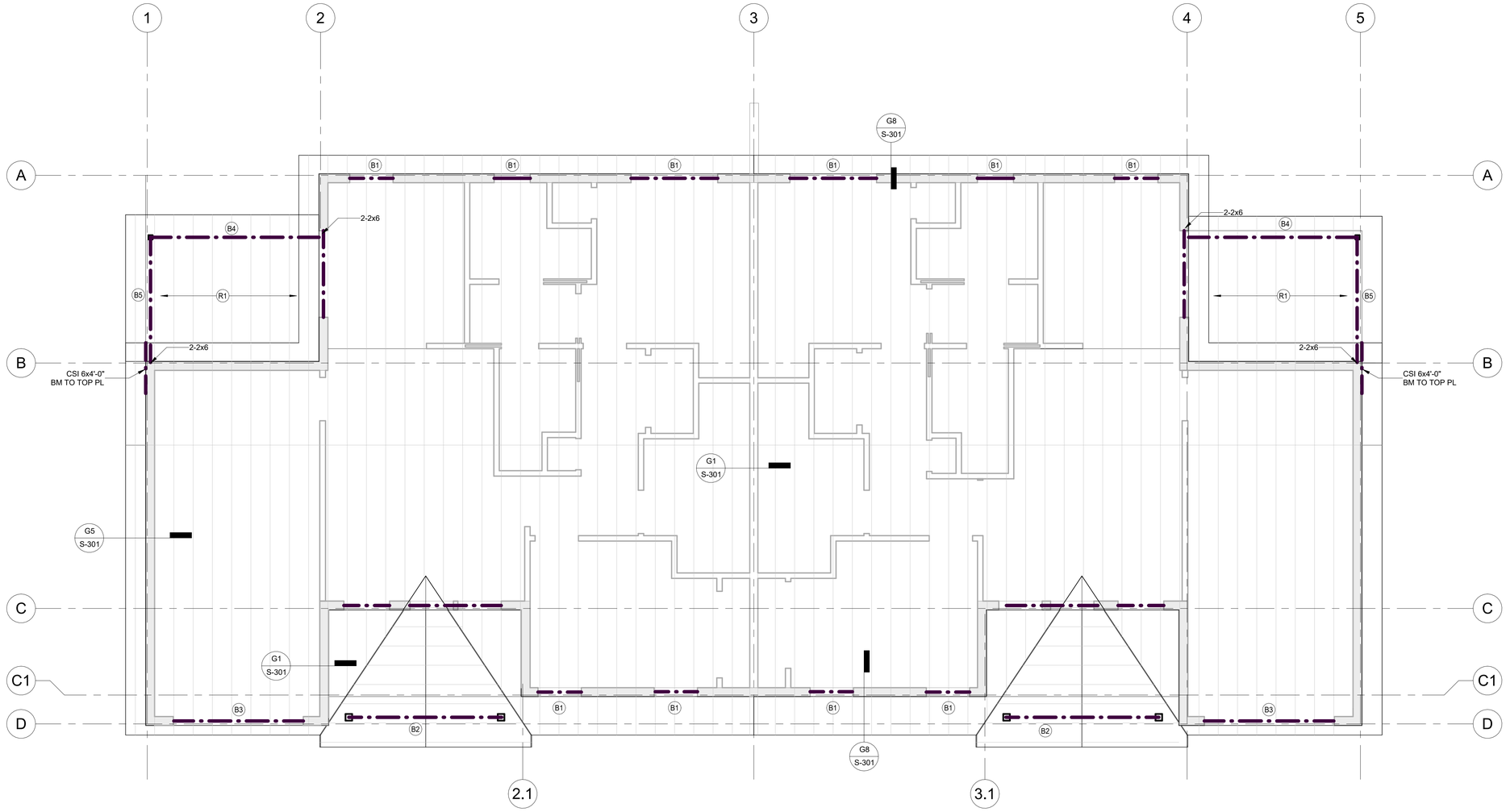

ROOF FRAMING PLAN

1/4" = 1'-0"

D1

ROOF BEAM SCHEDULE

BEAM ID	SIZE	LUMBER GRADE
B1	6 x 8	DF NO. 2
B2	6 x 12	DF NO. 2
B3	6 x 10	DF NO. 2
B4	4 x 10	DF NO. 2
B5	4 x 10	DF NO. 2
R1	2 x 4 @ 24" O.C.	DF NO. 2

TRUSSES ARE UNDER A DEFERRED SUBMITTAL.

1. THE OWNER / BUILDER IS RESPONSIBLE FOR SUBMITTING ALL ITEMS LISTED UNDER THE DEFERRED SUBMITTAL AS REQUIRED BY THE RELEVANT AUTHORITIES. THIS INCLUDES ANY ADDITIONAL DOCUMENTS, PERMITS, OR INFORMATION THAT WERE NOT INCLUDED IN THE PRE-APPROVED PLANS.
2. THE OWNER IS RESPONSIBLE IN SELECTING A TRUSS COMPANY TO SUPPLY THE TRUSSES. THE TRUSS COMPANY THAT WILL SUPPLY THE TRUSSES SHALL PROVIDE ADDITIONAL DOCUMENTS AND INFORMATION AS REQUIRED BY RELEVANT AUTHORITIES.
3. ALL TRUSS MANUFACTURERS SHALL HAVE AN "IN PLANT" INSPECTION BY AN APPROVED AGENCY PER CRC R106.1. SUBMIT CERTIFICATION TO THE FRESNO COUNTY DEVELOPMENT SERVICES DIVISION.

TRUSS NOTES

1. STRUCTURAL CALCULATIONS SHALL BE PROVIDED BY TRUSS MANUFACTURER FOR ALL TRUSS TYPES AND SHALL INCLUDE SUPPORT FOR MECHANICAL UNIT, PLATFORM AND ACCESS CATWALK.
2. TRUSS FABRICATOR SHALL PROVIDE A SCHEMATIC LAYOUT OF ALL TRUSSES SEQUENCE OF ERECTION AND INSTALLATION TO THE DESIGNER FOR REVIEW PRIOR TO PROCEEDING WITH CONSTRUCTION.
3. TRUSS-TO-TRUSS CONNECTIONS AND OTHER DETAILS RELATED TO TRUSSES SHALL BE VERIFIED BY TRUSS FABRICATOR, INCLUDING BRACING, STRONG BACKS AND ERECTION DETAILS.
4. ALL TRUSSES AND TRUSS DRAWINGS SHALL BE IN ACCORDANCE WITH APPLICABLE CODES AND DRAWINGS.
5. THE TRUSS DRAWINGS AND STRUCTURAL CALCULATIONS SHALL BE SUPPLIED BY THE TRUSS MANUFACTURER AND SUBMITTED FOR APPROVAL PRIOR TO BUILDING PERMITS BEING ISSUED.
6. TRUSS MANUFACTURER SHALL VERIFY ALL DIMENSIONS AT JOB SITE AND BRING ANY DISCREPANCIES WITH THESE PLANS TO THE ATTENTION OF THE ENGINEER OF RECORD PRIOR TO TRUSS FABRICATION.
7. THE GENERAL CONTRACTOR SHALL NOT PERMIT DRILLING, CUTTING OR ANY OTHER DAMAGE TO TRUSSES.
8. MAINTAIN 1/4" CLEARANCE BETWEEN TOP PLATE OF NON BEARING WALLS AND BOTTOM CHORDS OF TRUSSES, PROVIDE "SIMPSON" (OR EQ) ST TRUSS CLIP AT 48" O.C. (MAX) AT SUCH LOCATION.
9. PROVIDE 2 X 4 CONTINUOUS BRACING AT 10"-0"O.C. MAX. TO BOTTOM CHORDS OR AS REQUIRED BY TRUSS MANUFACTURER.
10. THE CONTRACTOR SHALL INSTALL TEMPORARY HORIZONTAL AND CROSS BRACING TO HOLD TRUSSES PLUMB AND IN SAFE CONDITION.
11. INSTALL PERMANENT BRACING PRIOR TO LOADING TRUSSES
12. PROVIDE SIMPSON CONNECTORS AT E.A. TRUSS END (TYPICAL).
13. INSTALL X BRACE AT BOTH ENDS AND AT 20' O.C. PER PLANS.
14. APPROVED TRUSS DRAWINGS MUST BE ON JOB SITE FOR INSPECTION PURPOSES

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

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CAPITAL PROJECTS DIVISION

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RENEWAL DATE 06/30/2025
STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

ROOF FRAMING PLAN

SCALE: As indicated

S-203

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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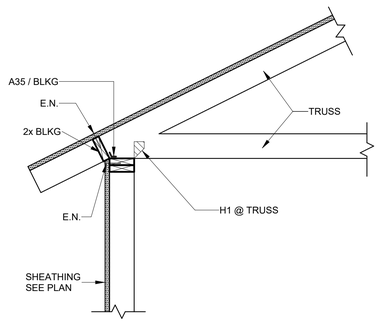
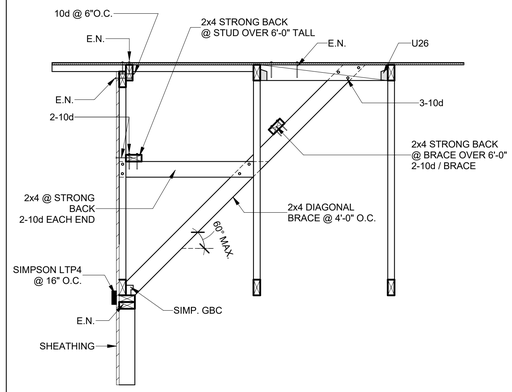
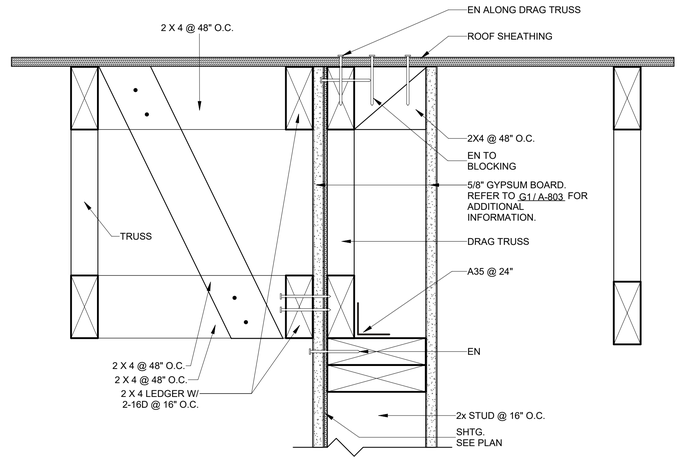
24" X 36"



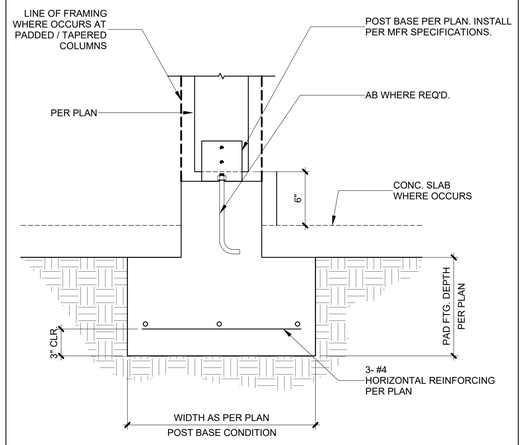
STRUCTURAL DETAIL A — G8
3/4" = 1'-0"



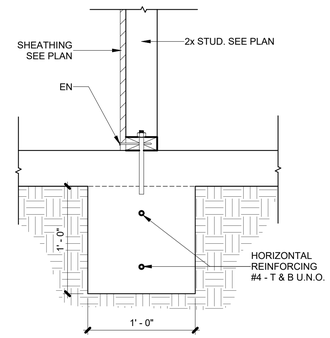
STRUCTURAL DETAIL B — G5
3/4" = 1'-0"



STRUCTURAL DETAIL C — G1
3" = 1'-0"

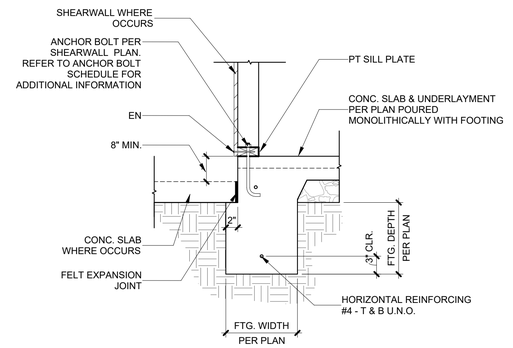


FOOTING @ POST DETAIL H — D8
1 1/2" = 1'-0"



INTERIOR FOOTING DETAIL G — D5
1 1/2" = 1'-0"

NOTE:
1. A MINIMUM 10-MIL VAPOR RETARDER CONFORMING TO ASTM E1745 CLASS A REQUIREMENTS WITH JOINTS LAPPED NOT LESS THAN 6 INCHES SHALL BE PLACED BETWEEN THE CONCRETE SLAB AND THE BASE COURSE OF THE PREPARED SUBGRADE WHERE THE BASE COURSE DOES NOT EXIST. [CRC R506.2.3].
2. FINGER JOINTED STUDS IN STRUCTURAL WALLS (BEARING OR SHEAR) SHALL BE APPROVED AND ARE NOT ALLOWED AT HOLDOWN LOCATIONS.



TYP. PERIMETER FOOTING DETAIL F — D1
1" = 1'-0"

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX
DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT — ROBINA R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JAN. 02, 2024

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TITLE

STRUCTURAL DETAILS

SCALE: As indicated

S-301

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY: Author	CHECKED BY: Checker

©

1/2/2024 4:32:58 PM
24" X 36"

GENERAL NOTES:

1. COORDINATION OF WORK: LAYOUT OF MATERIALS, EQUIPMENT AND SYSTEMS ARE GENERALLY DIAGRAMMATIC UNLESS SPECIFICALLY DIMENSIONED. SOME OF THE WORK MAY BE SHOWN OFFSET FOR CLARITY. THE ACTUAL LOCATION OF ALL MATERIALS, PIPING, DUCTWORK, FIXTURES, EQUIPMENT, SUPPORT, ETC. ALL DUCT AND PIPE ELBOWS AND ELEVATIONS ARE NOT SHOWN, CONTRACTOR TO ENSURE BID COVERS ELEVATION CHANGES TO INTERFERENCE WITH OTHER UTILITIES. ALL WORK SHALL BE CAREFULLY PLANNED PRIOR TO INSTALLATION OF ANY WORK TO AVOID ALL INTERFERENCES WITH EACH OTHER, OR WITH STRUCTURAL, ELECTRICAL, ARCHITECTURAL OR OTHER ELEMENTS. VERIFY THE PROPER VOLTAGE AND PHASE FOR ALL EQUIPMENT WITH THE ELECTRICAL PLANS. ALL CONFLICTS SHALL BE CALLED TO THE ATTENTION OF THE ARCHITECT AND ENGINEER PRIOR TO THE INSTALLATION OF ANY WORK OR ORDERING OF ANY EQUIPMENT.

2. CUTTING, BORING, SAW CUTTING OR DRILLING THROUGH THE NEW OR EXISTING STRUCTURAL ELEMENTS TO BE DONE ONLY WHEN SO DETAILED IN THE DRAWINGS OR ACCEPTED BY THE ARCHITECT AND STRUCTURAL ENGINEER WITH THE APPROVAL OF THE DSA REPRESENTATIVE OR AUTHORITY HAVING JURISDICTION.

3. PRIOR TO MECHANICAL PERMIT FINAL, A SMOKE DETECTOR SHUT-OFF TEST WILL BE REQUIRED. COORDINATE TESTING WITH FIRE PREVENTION. IF THERE IS AN ALARM PRESENT, THE SMOKE DETECTORS FOR UNIT SHUT-OFF SHALL BE SUPERVISED BY THE FIRE DETECTION OR ALARM SYSTEM AND INSTALLED IN ACCORDANCE WITH NFPA 72. DETECTION OF SMOKE IN ONE OF THE HVAC SUPPLY DUCT DETECTORS SHALL SHUT OFF THE POWER SOURCE TO ALL OF THE HVAC UNITS. 2022 CMC 608.1.

TITLE 24 MECHANICAL & PLUMBING REQUIREMENTS:

1. ALL AIR COOLED HVAC UNITS SHALL HAVE MINIMUM EFFICIENCIES PER TABLE 110.2-A PER CEC 2022
2. ALL FURNACES SHALL HAVE MINIMUM EFFICIENCIES PER TABLE 110.2-J PER CEC 2022
3. ALL FURNACES SHALL HAVE STAND BY LOSS CONTROLS PER SECTION 110.2 (d) PER CEC 2022
4. ALL THERMOSTATS SHALL COMPLY WITH 110 (b) OR (c) AS APPLICABLE PER CEC 2022
5. ALL HVAC SYSTEMS SHALL HAVE OUTSIDE (VENTILATION) AIR PER 120.1 (b) 2. ALSO SEE MECHANICAL PLANS FOR MINIMUM OUTSIDE AIR SETTINGS PER CEC 2022
6. WHEN CO_2 VENTILATION DEMAND CONTROLS ARE SPECIFIED, PROVIDE IN ACCORDANCE WITH 120.1 C PER CEC 2022
7. MINIMUM VENTILATION RATES SHALL BE INITIATED ONE HOUR PRIOR TO SCHEDULED OCCUPANCY PER 120.1 (c) 2 PER CEC 2022
8. EACH HVAC SYSTEM SHALL HAVE SHUT-OFF AND RESET CONTROLS COMPLYING WITH 120.2 (e) PER CEC 2022
9. ALL OUTSIDE AND EXHAUST DAMPERS SHALL AUTOMATICALLY CLOSE PER 120.2 (f) PER CEC 2022
10. ALL SYSTEMS GREATER THAN A NOMINAL 54 MBH COOLING CAPACITY SHALL HAVE ECONOMIZERS EQUIPPED WITH FAULT DETECTION AND DIAGNOSTICS PER 120.2 (i) PER CEC 2022
11. ALL DUCTWORK INSULATION SHALL COMPLY WITH 120.4 PER CEC 2022
12. SET UP ALL THERMOSTATS WITH A DEAD BAND OF NO LESS THAN (3) DEGREES TO PREVENT CYCLING BETWEEN HEATING AND COOLING.
13. ACCEPTANCE TESTS REQUIRED PRIOR TO GRANTING OCCUPANCY.
    - 13.1. OUTDOOR AIR VENTILATION SYSTEMS PER NA 7.5.1.
    - 13.2. CONSTANT VOLUME SINGLE ZONE SYSTEM CONTROLS PER NA 7.5.2.
    - 13.3. AIR ECONOMIZERS PER NA 7.5.4
    - 13.4. DEMAND CONTROL (CO_2) CONTROLS, WHEN REQUIRED, PER NA 7.5.5.
    - 13.5. FAULT DETECTION & DIAGNOSTICS (FDD) PER NA 7.5.11.
14. DUCT CONSTRUCTION STANDARD NOTE:
    - 14.1. All air distribution system ducts and plenums, including but not limited to building cavities, mechanical closets, air-handler boxes and support platforms used as ducts or plenums, shall meet the requirements of the CMC Sections 601.0, 602.0, 603.0, 604.0, and 605.0, and ANSI/SMACNA-006-2006 HVAC Duct Construction Standards Metal and Flexible, 3rd Edition incorporated herein by reference. Connections of metal ducts and the inner core of flexible ducts shall be mechanically fastened. Openings shall be sealed with mastic, tape, aerosol sealant or other duct-closure system that meets the applicable requirements of UL 181, UL 181A, or UL 181B. If mastic or tape is used to seal openings greater than 1/4 inch, the combination of mastic and either mesh or tape shall be used.Portions of supply-air and return-air ducts conveying heated or cooled air located in one or more of the following spaces shall be insulated to a minimum installed level of R-8:
      - 14.1.1. Outdoors; or
      - 14.1.2. In a space between the roof and an insulated ceiling; or
      - 14.1.3. In a space directly under a roof with fixed vents or openings to the outside or unconditioned spaces; or
      - 14.1.4. In an unconditioned crawlspace; or
      - 14.1.5. In other unconditioned spaces.
      - 14.1.6. Portions of supply-air ducts that are not in one of these spaces, including ducts buried in concrete slab, shall be insulated to a minimum installed level of R-4.2 or be enclosed in directly conditioned space.

EQUIPMENT ANCHORAGE:

ALL MECHANICAL, PLUMBING AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE APPROVED CONSTRUCTION DOCUMENTS. WHERE NO DETAIL IS INDICATED, THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACES TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2022 CBC, SECTIONS 1616A.1.18 THROUGH 1616A.1.26 AND ASCE 7-10 CHAPTER 13, 26 AND 30.

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY OR MOVABLE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER.
3. MOVEABLE EQUIPMENT WHICH IS STATIONED IN ONE PLACE FOR MORE THAN 8 HOURS AND HEAVIER THAN 400 POUNDS OR HAS A CENTER MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT ARE REQUIRED TO BE ANCHORED WITH TEMPORARY ATTACHMENTS.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT THE ATTACHMENT NEED NOT BE DETAILED ON THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

NOTE: PRIOR TO MECHANICAL PERMIT FINAL, A SMOKE DETECTOR SHUT OFF TEST WILL BE REQUIRED. COORDINATE TESTING WITH FIRE PREVENTION. IF THERE IS AN ALARM PRESENT, THE SMOKE DETECTOR FOR THE UNIT SHUT OFF SHALL BE SUPERVISED BY THE FIRE DETECTION OR ALARM SYSTEM AND INSTALLED IN ACCORDANCE WITH NFPA 72. DETECTION OF SMOKE IN ONE OF THE HVAC SUPPLY DUCT DETECTORS SHALL SHUT OFF THE POWER SOURCE TO ALL OF THE HVAC UNITS. 2022 CMC 608.1

APPLICABLE CODES AND REGULATIONS:

CALIFORNIA CODE OF REGULATIONS (C.C.R.)
PART 1 - 2022 CALIFORNIA STANDARDS ADMINISTRATIVE CODE, TITLE 24, C.C.R.
PART 2 - 2022 CALIFORNIA BUILDING CODE (C.B.C.), TITLE 24, C.C.R. VOLUMES 1-3.
PART 3 - 2022 CALIFORNIA ELECTRICAL CODE, TITLE 24, C.C.R.
PART 4 - 2022 CALIFORNIA MECHANICAL CODE (C.M.C.), TITLE 24 C.C.R.
PART 5 - 2022 CALIFORNIA PLUMBING CODE (C.P.C.), TITLE 24, C.C.R.
PART 6 - 2022 CALIFORNIA ENERGY CODE, TITLE 24, C.C.R.
PART 9 - 2022 CALIFORNIA FIRE CODE, TITLE 24, C.C.R.

AIR CONDITIONING LEGEND		
SYMBOL	ITEM	ABBR
	ROUND DUCT	
	EXISTING ROUND DUCT	
	SHEET METAL DUCT	
	DUCT WITH ACOUSTIC LINING	
	SUPPLY AIR DUCT DROP	
	RETURN AIR DUCT DROP	
	EXHAUST AIR DUCT DROP	
	SUPPLY AIR DUCT RISE	
	RETURN AIR DUCT RISE	
	EXHAUST AIR DUCT RISE	
	VOLUME DAMPER	
-0R-	FIRE DAMPER WITH ACCESS PANEL	FD
-0R-	FIRE/SMOKE DAMPER WITH ACCESS PANEL	FSD
CFM	CUBIC FEET OF AIR PER MINUTE	CFM
T	THERMOSTAT 48" AFF	
H	HUMIDISTAT	
	DIRECTION OF FLOW	
	SUPPLY AIR	SA
	RETURN AIR	RA
	EXHAUST AIR	EA
	OUTSIDE AIR	OSA
	PIPE OR DUCT TURN DOWN	
	PIPE OR DUCT TURN UP	
	POINT OF CONNECTION	POC
	EXISTING (DESIGNATED)	(E)
SD	SMOKE DETECTOR	SD
	DUCT TO BE DEMOLISHED	
RS	REMOTE SENSOR	RS
	BACK-DRAFT DAMPER	BDD

OUTDOOR UNIT SCHEDULE

TAG	ODU-1
MANUFACTURER	LG
MODEL#	LUU249HV
SIZE	2 TON
COOLING CAPACITY (MBH)	24
HEATING CAPACITY (MBH)	27
SEER	16.85
HSPF	9.0
COP (47°)	-
AIRFLOW (CFM)	2048
EER	11.7
VOLTAGE/ PHASE	208 - 230 / 1
MCA / MOCP / RLA / FLA	20 / 30 / - / -
WEIGHT (LBS)	150
ACCESSORIES	1

ACCESSORIES:
1. ROOF MOUNTED PER MANUFACTURES SPACING AND CLEARANCES, REFER TO DETAIL 'A'/M002 FOR ADDITIONAL INFORMATION

GRILLE SCHEDULE

TAG	A (SUPPLY)	B (RET / EX)	C (SUPPLY)
TYPE	HARD CEILING	HARD CEILING	WALL-MOUNTED
DESCRIPTION	TITUS 250-AA RECTANGULAR DIFFUSER. STANDARD #26 WHITE FINISH. TWO-WAY	TITUS 355FLF1 FACE FILTER GRILLE. STANDARD #26 WHITE FINISH. 1/2" BLADE SPACING.	TITUS-310RL-HD-1. STANDARD FINISH-#26 WHITE 1/2" BLADE SPACING/STEEL

INDOOR UNIT SCHEDULE

TAG	IDU-1
MANUFACTURER	LG
TYPE	HIGH STATIC DUCTED
MODEL#	LHN248HV
SIZE (TON)	2
COOLING (MBH)	24
HEATING (MBH)	27
SUPPLY (CFM)	777
ESP (IN.WG)	0.59
HP	-
POWER (KW)	2.05
VOLTAGE / PHASE	208-230 / 1
MCA / MOP / FLA	- / - / 1.6
WEIGHT (LBS)	72
ACCESSORIES	1, 2, 3

ACCESSORIES:
1. TITLE 24 COMPLIANT THERMOSTAT INSTALLED 48" AFF
2. INSTALL PER DETAIL 'B'/M002
3. MITSUBISHI, LG, OR APPROVED EQUAL OKAY FOR SUBSTITUTION

EXHAUST FAN SCHEDULE

TAG	CEF-1
MANUFACTURER	PANASONIC
MODEL#	FV-0511VQ1
CFM	110
ESP	0.1
RPM	957
VOLTAGE / PHASE	120 / 1
FLA	-
WEIGHT (LBS)	11
SONES	0.3
ACCESSORIES	1,2

ACCESSORIES:
1. PROVIDE BACK DRAFT DAMPER
2. INTERLOCK WITH LIGHT SWITCH

RANGE HOOD SCHEDULE

TAG	RH-1
MANUFACTURER	BROAN
MODEL#	EW4830
DESIGN CFM	400
EXTERNAL SP (IN WG)	0.1
SPEEDS	3
AMPS	1.6
VOLTAGE / PHASE	120 / 1
SONES	6.5
WEIGHT (LBS)	20
ACCESSORIES	1

INDEX:
M001 - MECHANICAL GENERAL NOTES, LEGEND, AND SCHEDULES
M002 - MECHANICAL DETAILS
M100 - MECHANICAL FLOOR PLAN

MECHANICAL GENERAL NOTES, LEGEND, AND SCHEDULES

SCALE: N.T.S.

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

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SEAL & SIGNATURE

REGISTERED PROFESSIONAL ENGINEER
JOE LON D. CHINN
No. M35784
Exp. 03-31-24
MECHANICAL
STATE OF CALIFORNIA

UPDATE

MAY 27, 2023

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TITLE

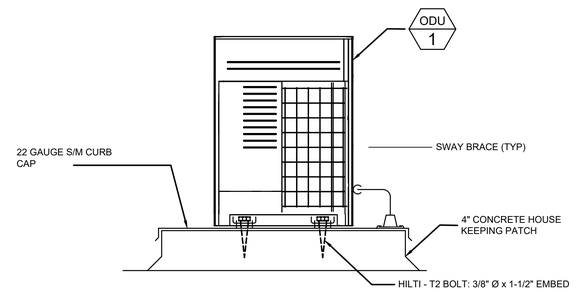
GN, LEGEND, AND SCHEDULES

SCALE N.T.S.

M001

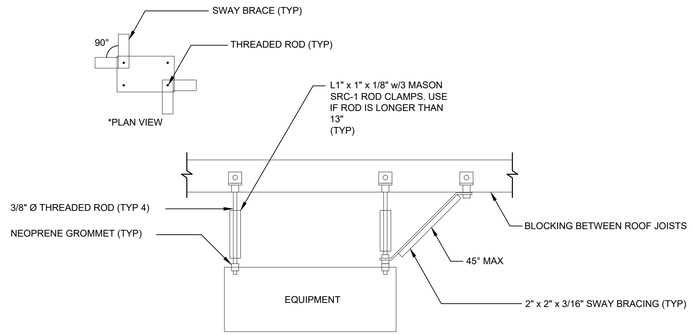
ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

6/8/2023 3:28:00 PM
24" X 36"



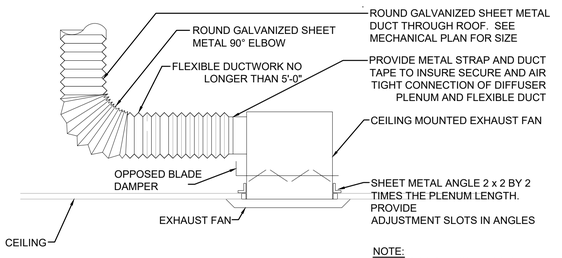
A OUTDOOR UNIT OR HEAT PUMP GROUND MOUNTED

SCALE: N.T.S.



B FAN COIL/ERV MOUNTING DETAIL

SCALE: N.T.S.



NOTE:
ANGLES REQUIRED WHERE DIFFUSER IS INSTALLED AS INDICATED. IF DIFFUSER GOES INTO A LAY-IN GRID, ANGLES ARE NOT REQUIRED.

C CEILING EXHAUST FAN MOUNTING DETAIL

SCALE: N.T.S.

MECHANICAL DETAILS

SCALE: N.T.S.

6/8/2023 3:28:00 PM
24" X 36"

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TITLE

MECHANICAL DETAILS

SCALE N.T.S.

M002

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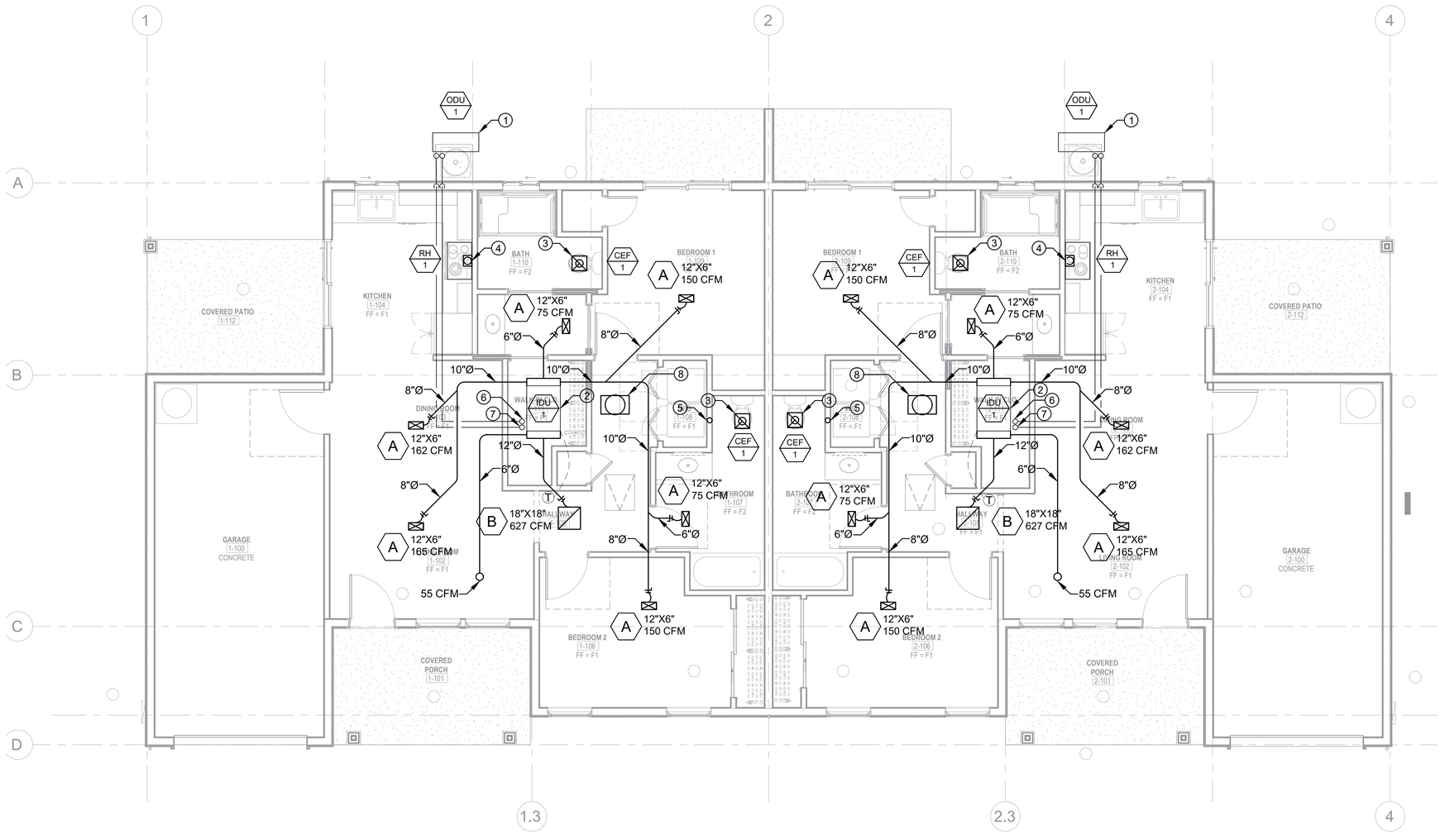
Author	Checker



KEYNOTES:

1. (N) OUTDOOR UNIT TO BE INSTALLED PER DETAIL 'A'/M002, ODU-1. FOR CLEARANCES REFER TO MANUFACTURER
2. (N) INDOOR UNIT TO BE INSTALLED PER DETAIL 'B'/M002, IDU-1
3. (N) CEILING EXHAUST FAN TO BE INSTALLED PER DETAIL 'C'/M002. 6" EXHAUST DUCT TO VENT THROUGH ROOF FROM CEILING EXHAUST FAN
4. (N) RESIDENTIAL KITCHEN HOOD, H-1. HOOD TO BE INSTALLED BY OTHERS. 6" EXHAUST DUCT TO VTR FROM KITCHEN HOOD
5. 4" EXHAUST DUCT FROM DRYER HOOD TO VENT THROUGH ROOF
6. 3/8" LIQUID REFRIGERANT LINE
7. 5/8" SUCTION REFRIGERANT LINE
8. QC-ES-3100 WHOLE HOUSE FAN TO BE INSTALLED WITH 16" DUCT FROM HOUSE FAN TO BE VENTED OUT INTO ATTIC. REFER TO INSTALLATION MANUAL FOR MORE INFORMATION

MECHANICAL FLOOR PLAN

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

DUPLEX DWELLING UNIT

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TITLE

MECHANICAL FLOOR PLAN

SCALE N.T.S.

M100

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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Author	Checker

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24" X 36"

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3. ALL WASTE PIPES THAT ARE SMALLER THAN 4" MUST HAVE A MINIMUM SLOPE OF 2%.
4. PROVIDE CLEANOUTS FOR WASTE LINES EXCEEDING 5 FEET FROM THE MAIN. CLEANOUTS SHALL BE SIZED PER CPC TABLE 707.1(CPC 707.4)
5. ALL TUB AND SHOWER VALVES ARE TO BE SINGLE CONTROL PRESSURE BALANCING OR THERMOSTATIC ANTI-SCALD TYPE
6. WATER HAMMER ARRESTORS SHALL BE INSTALLED AT THE FOLLOWING QUICK-ACTING SHUT-OFF VALVES (CPC 609.10)
   - 6.1. AUTOMATIC WASHING MACHINE (HOT AND COLD WATER)
   - 6.2. ICEMAKER
   - 6.3. DISHWASHER
   - 6.4. FRONT AND REAR SPRINKLER OUTLET

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6. WHEN CO_2 VENTILATION DEMAND CONTROLS ARE SPECIFIED, PROVIDE IN ACCORDANCE WITH 120.1 C.
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8. EACH HVAC SYSTEM SHALL HAVE SHUT-OFF AND RESET CONTROLS COMPLYING WITH 120.2 (e).
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10. ALL SYSTEMS GREATER THAN A NOMINAL 54 MBH COOLING CAPACITY SHALL HAVE ECONOMIZERS EQUIPPED WITH FAULT DETECTION AND DIAGNOSTICS PER 120.2 (i).
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THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE, BUT THE ATTACHMENT NEED NOT BE DETAILED ON THE PLANS. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVE A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

PIPING MATERIALS:

1. SANITARY SEWER AND VENT PIPING BELOW GROUND: JOHNS-MANVILLE RING-TITE OR EQUIVALENT, POLYVINYL CHLORIDE (PVC) GRAVITY PIPE, WHERE PERMITTED BY CODES.
2. SANITARY SEWER AND VENT PIPING ABOVE GROUND: ABS SCHEDULE 40 PIPE AND FITTINGS PER ASTM D2661 & ASTM D2660 PER TABLE 701.2
3. WATER PIPING ABOVE GROUND: HOT WATER, COLD WATER, AND FILTER WATER: TYPE 'L' COPPER WITH LEAD-FREE SOLDERED JOINTS OR PEX PIPE PER 2019 CPC TABLE 604.1
4. DOMESTIC WATER BELOW GRADE, SLAB, PAVED AREAS: POLYVINYL CHLORIDE (PVC) PRESSURE RATED SCHEDULE 40, ASTM D 2241, WITH RUBBER RINGS, ASTM D 1869. GALVANIZED MALLEABLE IRON, GALVANIZED STEEL, TYPE "M", OR TYPE "L" ARE PROHIBITED MATERIALS FOR WATER SUPPLY AND BUILDING WATER PIPING BOTH UNDERGROUND AND IN BUILDINGS
5. INSULATION OF DOMESTIC HOT WATER SUPPLY AND RETURN, CONDENSATE DRAIN PIPING: GLASS FIBER PIPE INSULATION WITH FACTORY APPLIED WHITE JACKET, J-M MICRO-LOK 750AP, 1 INCH THICK FOR PIPE SIZES 1 INCH AND SMALLER, AND 1-1/2" INCH THICK FOR PIPE SIZES 1-1/4" INCHES AND LARGER. HOT WATER PIPE INSULATION SHALL HAVE MINIMUM WALL THICKNESS OF NOT LESS THAN THE DIAMETER OF THE PIPE FOR A PIPE UP TO 2 INCHES IN DIAMETER. INSULATION WALL THICKNESS SHALL NOT BE LESS THAN 2 INCHES FOR A PIPE OF 2 INCHES OR MORE IN DIAMETER

APPLICABLE CODES AND REGULATIONS:

CALIFORNIA CODE OF REGULATIONS (C.C.R.)
PART 1 - 2022 CALIFORNIA STANDARDS ADMINISTRATIVE CODE, TITLE 24, C.C.R.
PART 2 - 2022 CALIFORNIA BUILDING CODE (C.B.C.), TITLE 24, C.C.R. VOLUMES 1-3.
PART 3 - 2022 CALIFORNIA ELECTRICAL CODE, TITLE 24, C.C.R.
PART 4 - 2022 CALIFORNIA MECHANICAL CODE (C.M.C.), TITLE 24 C.C.R.
PART 5 - 2022 CALIFORNIA PLUMBING CODE (C.P.C.), TITLE 24, C.C.R.
PART 6 - 2022 CALIFORNIA ENERGY CODE, TITLE 24, C.C.R.
PART 9 - 2022 CALIFORNIA FIRE CODE, TITLE 24, C.C.R.

PLUMBING FIXTURE AND EQUIPMENT SCHEDULE

TAG	FIXTURE	DESCRIPTION	HW	CW	VENT	WASTE/ SEWER
B-1	BATHTUB	ALOHA PROCELAIN ENAMEL 60" X 30" X 14 1/4" BATHTUB 40 DEGREE LUMBAR SUPPORT, 67 LBS	1/2"	1/2"	2"	2"
HB-1	HOSE BIBB	WOODFORD MODEL 65 WALL MOUNTED EXTERIOR HOSE BIBB, FREEZESELESS WALL HYDRANTS WITH SINGLE. CHECK HOSE CONNECTION		3/4"		
L-1	WALL HUNG LAVATORY (ADA)	KHOLER, UNDERMOUNT BATHROOM SINK CAXTON OVAL, MODEL #K-2210-N, VITRIOUS CHINA OVAL BASIN , WITH KHOLER, DEVONSHIRE MODEL #K-394-4 WIDESPREAD BATHROOM SINK FAUCET, 1.2 GPM WITH MIXING VALVE LEONARD 170A-LF MV-2	1/2"	1/2"	2"	2"
MV-1	MIXING VALVE	LEONARD LV-20-E-LF THERMOSTATIC MIXING VALVE ASSE 1017 COMPLIANT 1GPM MIN FLOW CAPACITY , LOCKING TEMPERATURE REGULATING HANDLE SET TO 125°F	3/4"	3/4"		
MV-2	POINT OF USE MIXING VALVE	LEONARD 170A-LF EXPOSED POINT OF USE MIXING VALVE, ASSE 1070 TO CONTROL DOWN TO 0.25GPM ECO-MIX CERTIFIED LEAD-FREE INTEGRAL INLET CHECKS AND STAINLESS STEEL SCREENS, 120°F MAX TEMPERATURE	3/4"	3/4"		
S-1	KITCHEN SINK	ZUHNE MODENA 30" ADA UNDERMOUNT KITCHEN SINK, T304 STAINLESS SINGLE BOWL. WITH KOHLER (OR EQUIVALENT), SIGNILE-HANDLE SEMI-PROFESSIONAL KITCHEN FAUCET, MODEL #K22033, 1.5 GPM	1/2"	1/2"	2"	2"
SH-1	SHOWER	FREEDOM ADA ROLL IN SHOWER, APF6232BF5PLR, 1" BARRIER FREE THRESHOLD WITH PRE-LEVELED AND REINFORCED SHOWER BASE, GRAB BARS, PRESSURE BALANCE VALVE, CAULKESS DRAIN. AND HAND HELD SHOWER	5/8"	5/8"	2"	2"
WC-1	WATER CLOSET (ADA)	TOTO CST744EL(R) ECO DRAKE TRANSITIONAL - ADA UNIVERSAL HEIGHT, TWO-PIECE ELONGATED, 1.28 GPF WATER CLOSET, FLUSH TANK		3/4"	2"	3"
WH-1	WATER HEATER	RHEEM, MODEL PROPH40 TO RH120, 12,000 BTU/HR, 3.0 UEF, 40 GALLON STORAGE CAPACITY, 242 LBS	3/4"	3/4"		

WATER CALCULATIONS PER UNIT

FIXTURES	QTY	COLD WATER*		HOT WATER*		SEWER/WASTE/VENT**	
		WSFU (EACH)	WSFU (TOTAL)	WSFU (EACH)	WSFU (TOTAL)	DFU (EACH)	DFU (TOTAL)
LAVATORY	2	1	2	0.75	1.5	1	2
SHOWER	2	2	4	1.5	3	2	4
WATER CLOSET (FLUSH TANK)	2	2.5	5	0	0	4	8
KITCHEN SINK	1	2	2	1.5	1.5	2	2
HOSE BIB	1	2.5	2.5	0	0	0	0
HOSE BIB (ADDITIONAL)	1	1	1	0	0	0	0
ICE MACHINE	1	2	2	0	0	0	0
CLOTHES WASHER	1	4	4	3	3	6	6
DISH WASHER	1	4	4	3	3	6	6
TOTAL			**26.5**		**12**		**28**

PER TABLE A 103.1.3, 2022 CALIFORNIA PLUMBING CODE
***PER TABLE 702.1, 2022 CALIFORNIA PLUMBING CODE*

INDEX:

P001 - PLUMBING GENERAL NOTES, LEGEND, AND SCHEDULES
P002 - PLUMBING DETAILS
P100 - PLUMBING FLOOR PLAN

PIPE SIZING SCHEDULE

COLD WATER				
SIZE (IN.)	FLOW (GPM)	FLUSH TANK (FU)	FLUSH VALVE (FU)	VELOCITY (FPS)
1/2	4.3	5	-	6.2
3/4	9	12	-	6.0
1	16	23	-	6.2
1 1/4	28	49	12	7.6
1 1/2	38	80	26	7.4
2	63	188	87	7.0
2 1/2	90	330	199	6.3

BASED ON CALIFORNIA PLUMBING CODE 2022 EDITION. MAX 8.0 FPS VELOCITY & ADJUSTED TO 3.0 PSIG PER 100 FT MAX PRESSURE DROP

PLUMBING LEGEND

SYMBOL	ITEM	ABBR.
———	SOIL OR WASTE	S or W
– – – –	VENT	V
VTR	VENT THRU ROOF	
—— · ——	DOMESTIC COLD WATER	CW
—— · ——	DOMESTIC HOT WATER	HW
– – – –	DOMESTIC HOT WATER RETURN	HWR
CD ———	CONDENSATE DRAIN	CD
———	EXISTING PIPING	(E)
(E)	EXISTING	
(N)	NEW	
—— · ——	FILTERED WATER	FW
—⊕—	FLOOR CLEANOUT	FCO
——|	WALL CLEANOUT	WCO
——○	PIPING TURN UP	
——○	PIPING TURN DOWN	
—✕—	POINT OF CONNECTION	
—⊗—	SHUT OFF VALVE BELOW GRADE	
—▷◁—	SHUT OFF VALVE	

PLUMBING GENERAL NOTES, LEGEND, AND SCHEDULES

SCALE: N.T.S.

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

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REGISTERED PROFESSIONAL ENGINEER — JOEL ON D. CHIMM — No. M35784 — Exp. 03-31-24 — MECHANICAL — STATE OF CALIFORNIA

UPDATE

2023 12 18

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TITLE

PLUMBING GENERAL NOTES, LEGEND AND SCHEDULES

SCALE N.T.S.

P001

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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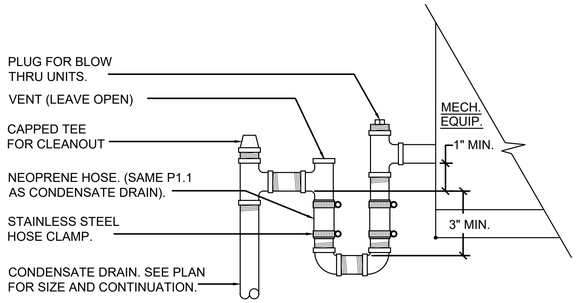
Author	Checker

24" X 36"



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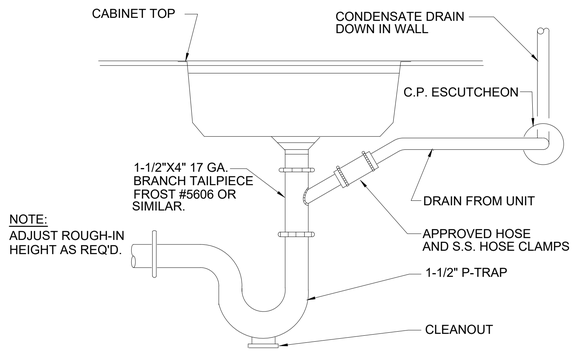
SCALE: N.T.S.

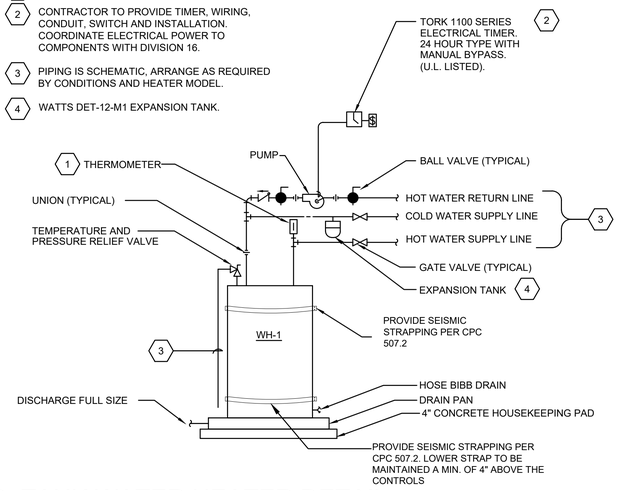


A CONDENSATE TO TAILPIECE DETAIL

SCALE: N.T.S.

NOTES:

1. 0°-250° F. SCALE, (VERTICAL MOUNT)
2. CONTRACTOR TO PROVIDE TIMER, WIRING, CONDUIT, SWITCH AND INSTALLATION. COORDINATE ELECTRICAL POWER TO COMPONENTS WITH DIVISION 16.
3. PIPING IS SCHEMATIC, ARRANGE AS REQUIRED BY CONDITIONS AND HEATER MODEL.
4. WATTS DET-12-M1 EXPANSION TANK.



B TANK WATER HEATER DETAIL

SCALE: N.T.S.

PLUMBING DETAILS

SCALE: N.T.S.

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24" X 36"

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX
DWELLING UNIT

PWP23-005

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TITLE

PLUMBING DETAILS

SCALE N.T.S.

P002

ISSUE DATE	JOB NUMBER
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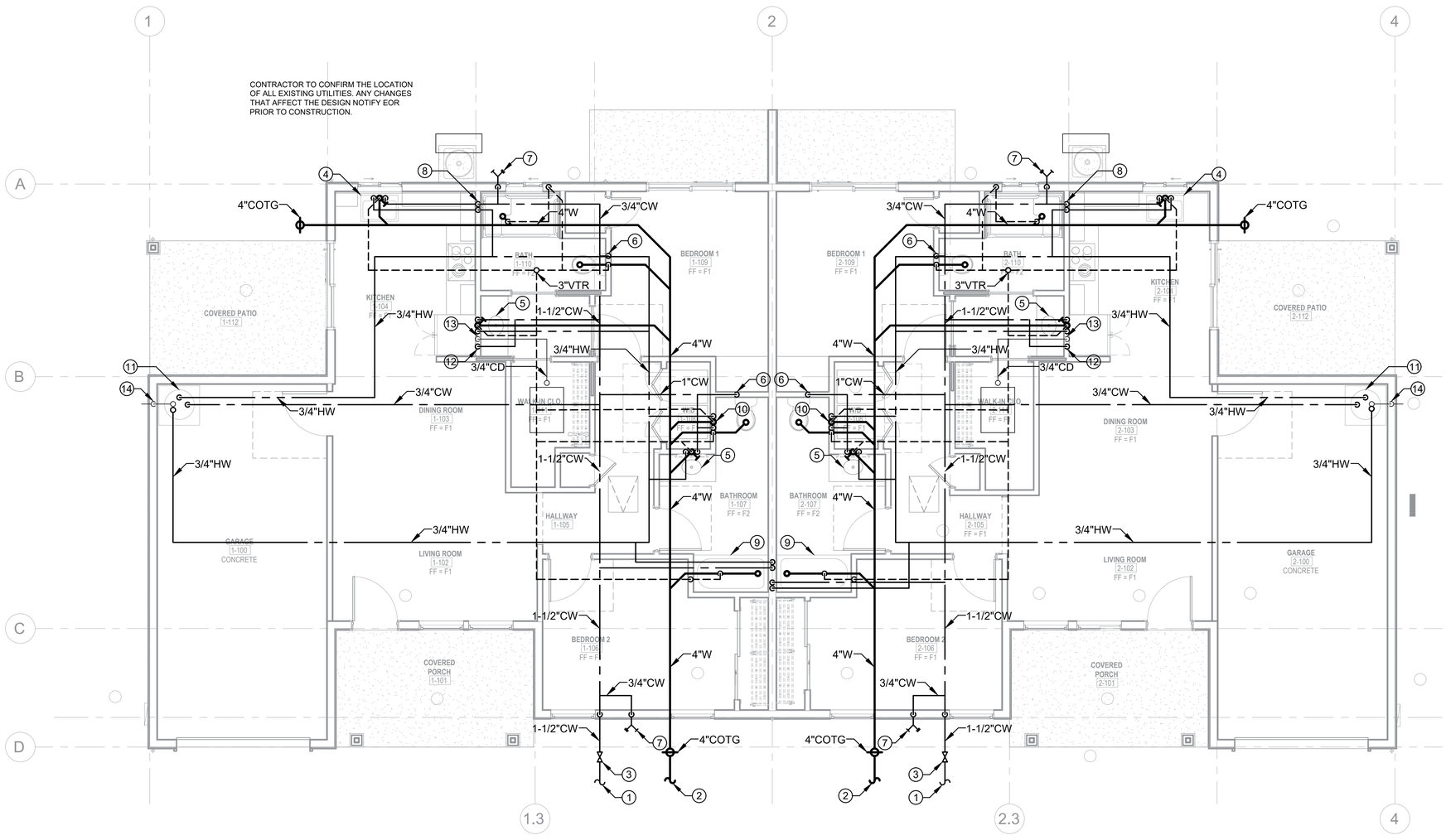
Author	Checker

CONTRACTOR TO CONFIRM THE LOCATION OF ALL EXISTING UTILITIES. ANY CHANGES THAT AFFECT THE DESIGN NOTIFY EOR PRIOR TO CONSTRUCTION.



KEYNOTES:

1. CONNECT NEW CW LINE TO MAIN LINE. CONNECTION TO MAIN LINE WILL CHANGE SINCE ORIENTATION OF BUILDING SITE IS NOT THE SAME FOR ALL BUILDINGS.
2. CONNECT NEW SEWER LINE TO MAIN SEWER LINE. CONNECTION TO MAIN LINE WILL CHANGE SINCE ORIENTATION OF BUILDING SITE IS NOT THE SAME FOR ALL BUILDINGS.
3. (N) COLD WATER S.O.V.
4. 1/2"CW, 1/2"HW, 2"W, & 2"V FOR COUNTER MOUNTED SINK, S-1. REFER TO SHEET P001 FOR MORE INFORMATION
5. 1/2"CW, 1/2"HW, 2"W, & 2"V FOR LAVATORY, L-1. REFER TO SHEET P001 FOR MORE INFORMATION
6. 3/4CW, 2"V, & 3"W FOR WATER CLOSET, WC-1. REFER TO SHEET P001 FOR MORE INFORMATION
7. 3/4"CW FOR HOSE BIBB, HB-1
8. 3/4"CW, 3/4" HW, 2"W & 2"V FOR ROLL IN SHOWER, SH-1
9. 3/4" CW, 3/4" HW, 2"W & 2"V FOR BATH TUB, B-1
10. 3/4" CW, 3/4" HW , 2"W & 2"V FOR CLOTHES WASHER
11. 3/4"CW & 3/4"HW FOR HEAT PUMP WATER HEATER TO BE INSTALLED PER DETAIL 'B'/P002, WH-1.
12. 1/2"CW FOR ICE MAKER IN REFRIGERATOR
13. 3/4"CD FROM INDOOR UNIT TO BE DRAINED INTO NEAREST LAVATORY PER DETAIL 'A'/P002
14. 3/4" CD FROM WATER HEATER TO BE DISCHARGED OUTSIDE 8" A.F.F.

PLUMBING FLOOR PLAN

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

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

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TITLE

PLUMBING FLOOR PLAN

SCALE N.T.S.

P100

ISSUE DATE	JOB NUMBER
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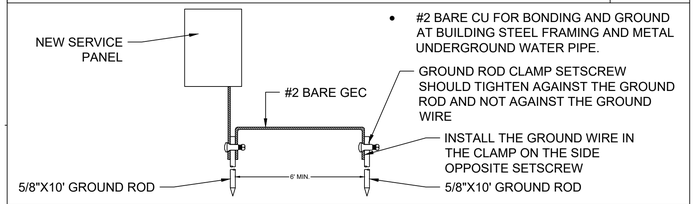
SMOKE/CARBON MONOXIDE NOTES

R314.2 SMOKE DETECTION SYSTEMS
R314.3 LOCATION. SMOKE ALARMS SHALL BE INSTALLED IN THE FOLLOWING LOCATIONS:
I. IN EACH SLEEPING ROOM.
2. OUTSIDE EACH SEPARATE SLEEPING AREA IN THE IMMEDIATE VICINITY OF THE BEDROOMS.
R314.4 POWER SOURCE. SMOKE ALARMS SHALL RECEIVE THEIR PRIMARY POWER FROM THE BUILDING WIRING PROVIDED THAT SUCH WIRING IS SERVED FROM A COMMERCIAL SOURCE AND SHALL BE EQUIPPED WITH A BATTERY BACKUP. SMOKE ALARMS WITH INTEGRAL STROBES THAT ARE NOT EQUIPPED WITH BATTERY BACKUP SHALL BE CONNECTED TO AN EMERGENCY ELECTRICAL SYSTEM. SMOKE ALARMS SHALL EMIT A SIGNAL WHEN THE BATTERIES ARE LOW.
R314.5 INTERCONNECTION.
WHERE MORE THAN ONE SMOKE ALARM IS REQUIRED TO BE INSTALLED WITHIN AN INDIVIDUAL DWELLING OR SLEEPING UNIT, THE SMOKE ALARM SHALL BE INTERCONNECTED IN SUCH A MANNER THAT THE ACTIVATION OF ONE ALARM WILL ACTIVATE ALL OF THE ALARMS IN THE INDIVIDUAL UNIT. THE ALARMS SHALL BE CLEARLY AUDIBLE IN ALL BEDROOMS OVER BACKGROUND NOISE LEVELS WITH ALL INTERVENING DOORS CLOSED.
R315.1 CARBON MONOXIDE ALARMS.
R315.1.1 POWER SUPPLY. FOR NEW CONSTRUCTION REQUIRED CARBON MONOXIDE ALARMS SHALL RECEIVE THEIR PRIMARY POWER FROM THE BUILDING WIRING
WHERE SUCH WIRING IS SERVED FROM A COMMERCIAL SOURCE AND SHALL BE EQUIPPED WITH A BATTERY BACK-UP.
R315.1.2 INTERCONNECTION. WHERE MORE THAN ONE CARBON MONOXIDE ALARM IS REQUIRED TO BE INSTALLED WITHIN THE DWELLING UNIT'OR WITHIN A
SLEEPING UNIT THE ALARMS SHALL BE INTERCONNECTED IN A MANNER THAT ACTIVATION OF ONE ALARM SHALL ACTIVATE ALL OF THE ALARMS IN THE. INDIVIDUAL UNIT.
R315.3 ALARM REQUIREMENTS. CARBON MONOXIDE ALARMS REQUIRED BY SECTION R315.1 AND R315.2 SHALL BE INSTALLED IN THE FOLLOWING LOCATIONS:
1. OUTSIDE OF EACH SEPARATE DWELLING UNIT SLEEPING AREA. IN THE IMMEDIATE VICINITY OF THE BEDROOM(S).
2, AT EVERY LEVEL OF A DWELLING UNIT INCLUDING BASEMENTS.

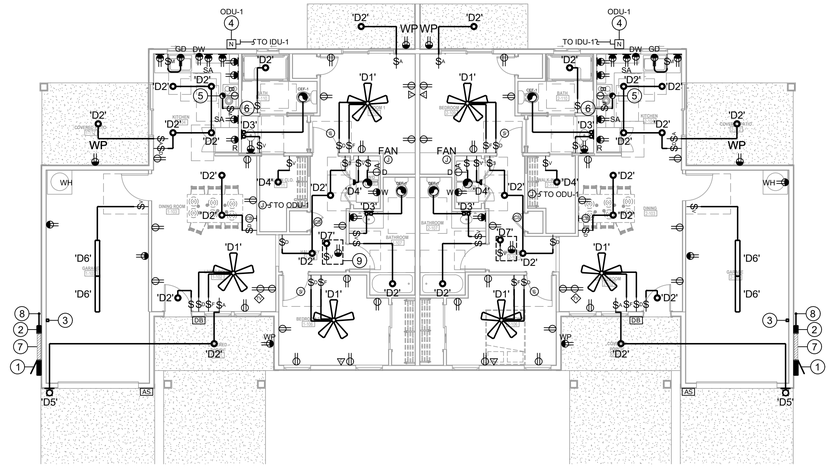
GROUND ROD DETAIL



UNIT FIXTURE SCHEDULE

SYMB.	TYPE	MAKE AND MODEL	MNTG.	LAMP / BULB	VOLT	NOTES
	'D1'	AIRE DELUXE #FP6285B	J-BOX	20W LED	120	
	'D2'	LITHONIA# WF6ELED-30K-90CRI-MW-M6	REC.	11W LED	120	DIM, WET RATD,
	'D3'	PROJECT SOURCE MOD# 42007 ITEM# 1362638	SURF.	60W LED	120	DAMP RATED
	'D4'	C-LITE# C-DS4-650-27	SURF.	11W LED	120	DIM, WET RATD,
	'D5'	PROJECT SOURCE MOD# 40683 ITEM# 338648	SURF.	11W LED	120	WET RATD,
	'D6'	ENERGETIC LIGHTING #E3SLA10D-840	SURF.	60W LED	120	WET RATD,
	'D7'	DESIGNHOUSE# MOD#587238 ITEM#1004060081	FLUSH	60W LED	120	DAMP RATD,

LIGHTING FIXTURE SCHEDULE
N.T.S



FLOOR NOTES:
1. FOR ADAPTABLE UNITS, PLEASE REFER TO ARCHITECTURAL DRAWINGS FOR REACH RANGE REQUIREMENTS.
2. ELECTRICAL RECEPTACLE OUTLETS, SWITCHES, AND CONTROLS (INCLUDING CONTROLS FOR HEATING AND VENTILATION AND AIR CONDITIONING) INTENDED TO BE USED BY THE OCCUPANTS SHALL BE LOCATED NO MORE THAN 48 INCHES MEASURED FROM THE TOP OF THE OUTLET BOX AND NOT LESS THAN 15 INCHES MEASURE FROM THE BOTTOM OF THE OUTLET BOX ABOVE THE FINISH FLOOR.

UNIT 1	996 SF
UNIT 2	996 SF
TOTAL: 2	1992 SF

ELECTRICAL FLOOR PLAN
1/8" = 1'-0"

E1

ELECTRICAL PLAN KEYNOTES

1. NEW 225ABUSS-120/240V-1PH-3W-N3R MAIN SERVICE PANEL WITH 200A MAIN CIRCUIT BREAKER. MAIN ELECTRICAL POWER PANEL.
2. POSSIBLE LOCATION OF FUTURE SOLAR PANEL INVERTER.
3. POSSIBLE LOCATION OF FUTURE. EV CHARGING STATION. VERIFY EXACT LOCATION DURING INSTALLATION.
4. 240V-30A-2P-N3R DISCONNECT FOR CONDENSING UNIT.
5. ABOVE IN CABINET FOR HOOD EXHAUST.
6. SWITCH FOR HOOD FAN.
7. 3 FT OF ALLOCATED SPACE RESERVED FOR FUTURE SYSTEM ISOLATION/TRANSFER EQUIPMENT. DEDICATED RACEWAY SHALL BE BEHIND CLEARANCE.
8. INTERCONNECTION PATHWAY. REFER TO ARCHITECTURAL PLANS FOR SOLAR ZONE AREA.
9. LIGHT FIXTURE AND RECEPTACLE IN ATTIC. SEE BUILDING SECTIONS.

ELECTRICAL LEGEND

- $ SINGLE POLE SWITCH
- $3 3 WAY SWITCH
- $D DIMMER SWITCH
- $F FAN SPEED SWITCH
- $M MOTOR RATED SWITCH
- $V VACANCY SWITCH
- $A ASTRONOMICAL SWITCH
- $H HUMIDITY SENSOR SWITCH
- DUPLEX - +15" BOTTOM OF RECEPTACLE BOX
- DUPLEX - ABOVE COUNTER - +48" TOP OF RECEPTACLE BOX
- DUPLEX - GROUND FAULT CIRCUIT INTERRUPTER - +15" BOTTOM OF RECEPTACLE BOX
- GFCI DUPLEX - ABOVE COUNTER - +48" TOP OF RECEPTACLE BOX
- RECEPTACLE - SPECIAL (RATING AS INDICATED)
- RECEPTACLE - 30A. 120/240V. NEMA 14-30R (CLOTHES DRYER TYPE)
- RECEPTACLE - 50A. 120/240V. NEMA 14-50R (DOMESTIC RANGE TYPE)
- COMMUNICATION DATA
- TV DATA AND DUPLEX - + 60" (FIELD VERIFY HEIGHT
- DISCONNECT
- (S) SMOKE ALARM 'BRK', 7010B W/ BATTERY BACK-UP, HARD WIRED, MOUNT WITHIN 6 INCHES OF HIGH POINT OF CEILING. (CSFM 7257-0087:140)
- (CO) CARBON MONOXIDE/SMOKE ALARM 'BRK', SC910B W/ BATTERY BACK-UP, HARD WIRED, MOUNT WITHIN 6 INCHES OF HIGH POINT OF CEILING. (CSFM 7256-0087:140)
- (HI) (HEARING IMPAIRED UNITS) SMOKE ALARM & STROBE COMBINATION 'BRK' 7010BSL, W/ BATTERY BACK-UP, HARD WIRED. MOUNT WITHIN 6 INCHES OF HIGH POINT OF CEILING. (CSFM 7257-0087:159)
- (HC) (HEARING IMPAIRED UNITS) CARBON MONOXIDE ALARM 'BRK' CO5120BN, W/ BATTERY BACK-UP, HARD WIRED. MOUNT WITHIN 6 INCHES OF HIGH POINT OF CEILING. (CSFM 7256-0087:159)
- (CB) CHIME BELL
- (DB) DOOR BELL
- (AS) ILLUMINATED ADDRESS SIGN
- EXHAUST FAN - SPECS PER MECHANICAL PLANS

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

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PWP23-005

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UPDATE

May 2, 2023_ CD Phase

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TITLE

ELECTRICAL FLOOR PLAN

SCALE 1/8" = 1'-0"

E-101

ISSUE DATE	JOB NUMBER
APRIL 12, 2023	2023_20
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Author	Checker

PANEL: DUP — 225 AMP BUS, 120/240V, 1 PH, 3 W, 100% RATED NEUTRAL — MAIN: 200A MCB, TRIP: 80% RATED, A.I.C.: 42000 A — LOCATION: EXTERIOR, MOUNTING: SURFACE, ENCLOSURE: NEMA 3R
996 SQ.FT. OPT 1
PANEL

CKT NO.	BREAKER AMP	BREAKER POLE	NOTES	SERVES	VOLT-AMPERES LOAD	A	B	C	LOAD	SERVES	NOTES	BREAKER AMP	BREAKER POLE	CKT NO.
1	20	1		ELECTRIC WATER HEATER	1000	2260			1260	LIVING/DINNING ROOM RECEPTACLES	AFCI	20	1	2
3	20	1	AFCI / ESS	SMALL APPLIANCE - RECEPTACLE	1000			1900	900	BEDROOM 1	AFCI / ESS	20	1	4
5	20	1	AFCI	SMALL APPLIANCE - RECEPTACLE	1000	2080			1080	BEDROOM 2 & HALLWAY	AFCI	20	1	6
7	20	1	AFCI	LAUNDRY RECEPTACLE	1000			1720	720	KITCHEN RECEPTACLES	AFCI	20	1	8
9	20	1		BATHROOM 1	251	1451			1200	REFRIGERATOR	AFCI / ESS	20	1	10
11	20	1		BATHROOM 2	251			851	600	GARBAGE DISPOSAL	AFCI	20	1	12
13	20	1	AFCI / ESS	LIGHTING	619	2699			2080	OUTDOOR/INDOOR UNIT ODU-1/IDU-1		30	2	14
15	20	1		EXTERIOR GFI RECEPTACLE	540			2620	2080					16
17	20	1	AFCI	HOOD & FAN	180	360			180	GARAGE		20	1	18
19								285	285	WHOLE HOUSE FAN		20	1	20
21						0								22
23							0							24
25						0								26
27							0							28
29						0								30
31				"For Future 240V Use" - Heat Pump Space Heater Ready - 30A MIN.				0						32
33						0								34
35	50	2		Electric Cooktop Ready	4800			4800		"For Future 240V Use" - Electric Vehicle Charging Station				36
37					4800	4800								38
39	30	2		Electric Clothes Dryer Ready	2880			2880		"For Future Solar Electric" (MIN. 2.63KW DC)				40
41					2880	2880								42
				TOTAL CONNECTED LOAD (VA) :	16530			15056						
				TOTAL CALCULATED LOAD (VA) :	16530			15056		TOTAL CALCULATED LOAD FOR PANEL: 31586 VA				
				TOTAL CALCULATED LOAD (AMPS) :	137.8			125.5						

NOTES:
AFCI ARC-FAULT CIRCUIT-INTERRUPTING BREAKER
ESS BRANCH CIRCUIT IDENTIFIED AS SUITABLE TO BE SUPPLIED BY THE FUTURE ESS.

PANEL SCHEDULE NOTES:
1. ALL SERVICES SUPPLYING DWELLING UNITS SHALL BE PROVIDED WITH A SURGE-PROTECTIVE DEVICE (SPD).
2. THE SPD SHALL BE AN INTEGRAL PART OF THE SERVICE EQUIPMENT OR SHALL BE LOCATED IMMEDIATELY ADJACENT THERETO.
   2.1. EXCEPTION: THE SPD SHALL NOT BE REQUIRED TO BE LOCATED IN THE SERVICE EQUIPMENT AS REQUIRED IN (B) IF LOCATED AT EACH NEXT LEVEL DISTRIBUTION EQUIPMENT DOWNSTREAM TOWARD THE LOAD
3. THE SPD SHALL BE A TYPE 1 OR TYPE 2 SPD.

PANEL SCHEDULE
N.T.S

1. INDOOR LUMINAIRES SHALL HAVE A COLOR RENDERING INDEX (CRI) OF AT LEAST 90.
2. ALL INSTALLED LUMINAIRES SHALL MEET THE REQUIREMENTS OF CALIFORNIA ENERGY CODE TABLE 150.0-A. SEE SECTION 150(K)1A FOR EXCEPTIONS.
3. SCREW-BASED LUMINAIRES SHALL CONTAIN LAMPS THAT COMPLY WITH REFERENCE JOINT APPENDIX JA8.
4. RECESSED DOWNLIGHT LUMINAIRES IN CEILINGS. LUMINAIRES RECESSED INTO CEILINGS SHALL MEET ALL OF THE FOLLOWING REQUIREMENTS:
   4.1. I. SHALL NOT CONTAIN SCREW BASE LAMP SOCKETS; AND
   4.2. II. HAVE A LABEL THAT CERTIFIES THE LUMINAIRE IS AIRTIGHT WITH AIR LEAKAGE LESS THAN 2.0 CFM AT 75 PASCALS WHEN TESTED IN ACCORDANCE WITH ASTM E283. AN EXHAUST FAN HOUSING WITH INTEGRAL LIGHT SHALL NOT BE REQUIRED TO BE CERTIFIED AIRTIGHT; AND
   4.3. III. BE SEALED WITH A GASKET OR CAULK BETWEEN THE LUMINAIRE HOUSING AND CEILING, AND HAVE ALL AIR LEAK PATHS BETWEEN CONDITIONED AND UNCONDITIONED SPACES SEALED WITH A GASKET OR CAULK, OR BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS TO MAINTAIN AIR TIGHTNESS BETWEEN THE LUMINAIRE HOUSING AND CEILING; AND
   4.4. IV. MEET THE CLEARANCE AND INSTALLATION REQUIREMENTS OF CALIFORNIA ELECTRICAL CODE SECTION 410.116 FOR RECESSED LUMINAIRES.
5. BLANK ELECTRICAL BOXES. THE NUMBER OF ELECTRICAL BOXES THAT ARE MORE THAN 5 FEET ABOVE THE FINISHED FLOOR AND DO NOT CONTAIN A LUMINAIRE OR OTHER DEVICE SHALL BE NO GREATER THAN THE NUMBER OF BEDROOMS. THESE ELECTRICAL BOXES MUST BE SERVED BY A DIMMER, VACANCY SENSOR CONTROL, LOW VOLTAGE WIRING OR FAN SPEED CONTROL.
6. LIGHTING SHALL HAVE READILY ACCESSIBLE WALL-MOUNTED CONTROLS THAT ALLOW THE LIGHTING TO BE MANUALLY TURNED ON AND OFF.
   6.1. EXCEPTION TO SECTION 150.0(K)2A: CEILING FANS MAY PROVIDE CONTROL OF INTEGRATED LIGHTING VIA A REMOTE CONTROL.
7. NO CONTROLS SHALL BYPASS A DIMMER, OCCUPANT SENSOR OR VACANCY SENSOR FUNCTION WHERE THAT DIMMER OR SENSOR HAS BEEN INSTALLED TO COMPLY WITH SECTION 150.0(K).
8. AUTOMATIC-OFF CONTROLS.
   8.1. I. IN BATHROOMS, GARAGES, LAUNDRY ROOMS, UTILITY ROOMS AND WALK-IN CLOSETS, AT LEAST ONE INSTALLED LUMINAIRE SHALL BE CONTROLLED BY AN OCCUPANCY OR VACANCY SENSOR PROVIDING AUTOMATIC-OFF FUNCTIONALITY.
   8.2. II. FOR LIGHTING INTERNAL TO DRAWERS AND CABINETRY WITH OPAQUE FRONTS OR DOORS, CONTROLS THAT TURN THE LIGHT OFF WHEN THE DRAWER OR DOOR IS CLOSED SHALL BE PROVIDED.
9. VACANCY SENSOR CONTROLS SHALL USE A NEUTRAL CONDUCTOR FOR OPERATING CURRENT.
10. DIMMING CONTROLS. LIGHTING IN HABITABLE SPACES, INCLUDING BUT NOT LIMITED TO LIVING ROOMS, DINING ROOMS, KITCHENS AND BEDROOMS, SHALL HAVE READILY ACCESSIBLE WALL-MOUNTED DIMMING CONTROLS THAT ALLOW THE LIGHTING TO BE MANUALLY ADJUSTED UP AND DOWN.
11. INDEPENDENT CONTROLS. INTEGRATED LIGHTING OF EXHAUST FANS SHALL BE CONTROLLED INDEPENDENTLY FROM THE FANS.
12. FOR SINGLE-FAMILY RESIDENTIAL BUILDINGS, OUTDOOR LIGHTING PERMANENTLY MOUNTED TO A RESIDENTIAL BUILDING OR TO OTHER BUILDINGS ON THE SAME LOT SHALL MEET THE REQUIREMENT IN ITEM I AND THE REQUIREMENTS IN EITHER ITEM II OR ITEM III:
   12.1. I. CONTROLLED BY A MANUAL ON AND OFF CONTROL SWITCH THAT PERMITS THE AUTOMATIC ACTIONS OF ITEMS II OR III BELOW; AND
   12.2. II. CONTROLLED BY A PHOTOCELL AND EITHER A MOTION SENSOR OR AN AUTOMATIC TIME SWITCH CONTROL; OR
   12.3. III. CONTROLLED BY AN ASTRONOMICAL TIME CLOCK CONTROL.
13. CONTROLS THAT OVERRIDE TO ON SHALL NOT BE ALLOWED UNLESS THE OVERRIDE AUTOMATICALLY RETURNS THE AUTOMATIC CONTROL TO ITS NORMAL OPERATION WITHIN 6 HOURS. AN ENERGY MANAGEMENT CONTROL SYSTEM THAT PROVIDES THE SPECIFIED LIGHTING CONTROL FUNCTIONALITY AND COMPLIES WITH ALL REQUIREMENTS APPLICABLE TO THE SPECIFIED CONTROLS MAY BE USED TO MEET THESE REQUIREMENTS.
14. ILLUMINATED ADDRESS SIGN SHALL NOT CONSUMER NO MORE THAN 5 WATTS OF POWER.
15. ENERGY STORAGE SYSTEMS (ESS) READY. AT LEAST ONE OF THE FOLLOWING SHALL BE PROVIDED:
   15.1. A. ESS READY INTERCONNECTION EQUIPMENT WITH A MINIMUM BACKED-UP CAPACITY OF 60 AMPS AND A MINIMUM OF FOUR ESS-SUPPLIED BRANCH CIRCUITS, OR
   15.2. B. A DEDICATED RACEWAY FROM THE MAIN SERVICE TO A PANELBOARD (SUBPANEL) THAT SUPPLIES THE BRANCH CIRCUITS IN SECTION 150.0(S)(2). ALL BRANCH CIRCUITS ARE PERMITTED TO BE SUPPLIED BY THE MAIN SERVICE PANEL PRIOR TO THE INSTALLATION OF AN ESS. THE TRADE SIZE OF THE RACEWAY SHALL BE NOT LESS THAN ONE INCH. THE PANELBOARD THAT SUPPLIES THE BRANCH CIRCUITS (SUBPANEL) MUST BE LABELED "SUBPANEL SHALL INCLUDE ALL BACKED-UP LOAD CIRCUITS."
16. A MINIMUM OF FOUR BRANCH CIRCUITS SHALL BE IDENTIFIED AND HAVE THEIR SOURCE OF SUPPLY COLLOCATED AT A SINGLE PANELBOARD SUITABLE TO BE SUPPLIED BY THE ESS. AT LEAST ONE CIRCUIT SHALL SUPPLY THE REFRIGERATOR, ONE LIGHTING CIRCUIT SHALL BE LOCATED NEAR THE PRIMARY EGRESS, AND AT LEAST ONE CIRCUIT SHALL SUPPLY A SLEEPING ROOM RECEPTACLE OUTLET.
17. THE MAIN PANELBOARD SHALL HAVE A MINIMUM BUSS BAR RATING OF 225 AMPS.
18. SUFFICIENT SPACE SHALL BE RESERVED TO ALLOW FUTURE INSTALLATION OF A SYSTEM ISOLATION EQUIPMENT/TRANSFER SWITCH WITHIN 3 FEET OF THE MAIN PANELBOARD. RACEWAYS SHALL BE INSTALLED BETWEEN THE PANELBOARD AND THE SYSTEM ISOLATION EQUIPMENT/TRANSFER SWITCH LOCATION TO ALLOW THE CONNECTION OF BACKUP POWER SOURCE.
19. EXHAUST FANS SHALL BE CONTROLLED INDEPENDENTLY.
20. ASTRONOMICAL TIME-SWITCH CONTROLS SHALL:
   20.1. HAVE SUNRISE AND SUNSET PREDICTION ACCURACY WITHIN PLUS-OR-MINUS 15 MINUTES AND TIMEKEEPING ACCURACY WITHIN 5 MINUTES PER YEAR;
   20.2. BE CAPABLE OF DISPLAYING DATE, CURRENT TIME, SUNRISE TIME, SUNSET TIME, AND SWITCHING TIMES FOR EACH STEP DURING PROGRAMMING;
   20.3. BE CAPABLE OF AUTOMATICALLY ADJUSTING FOR DAYLIGHT SAVINGS TIME; AND
   20.4. HAVE THE ABILITY TO INDEPENDENTLY OFFSET THE ON AND OFF FOR EACH CHANNEL BY AT LEAST 90 MINUTES BEFORE AND AFTER SUNRISE OR SUNSET.

CALIFORNIA ENERGY CODE T24 NOTES
N.T.S.

E2

CALIFORNIA ELECTRICAL CODE NOTES

1. COORDINATE WITH UTILITY COMPANY PROVIDER PRIOR TO COMMENCING WORK. THE AVAILABLE FAULT CURRENT WILL BE PROVIDED BY THE UTILITY PROVIDER.
2. LIGHTING FIXTURES SPECIFIED CAN BE SUBSTITUTED WITH AN EQUIVALENT FIXTURE.
3. UNLESS OTHERWISE NOTED; ELECTRICAL RECEPTACLE OUTLETS ON BRANCH CIRCUITS OF 30 AMPERES OR LESS AND COMMUNICATION SYSTEM RECEPTACLES SHALL BE LOCATED NO MORE THAN 48 INCHES MEASURED FROM THE TOP OF THE RECEPTACLE OUTLET BOX NOR LESS THAN 15 INCHES (381 MM) MEASURED FROM THE BOTTOM OF THE RECEPTACLE OUTLET BOX TO THE LEVEL OF THE FINISHED FLOOR OR WORKING PLATFORM.
4. UNLESS OTHERWISE NOTED; CONTROLS OR SWITCHES INTENDED TO BE USED BY THE OCCUPANT OF THE ROOM OR AREA TO CONTROL LIGHTING AND RECEPTACLE OUTLETS, APPLIANCES, ALARMS OR COOLING, HEATING AND VENTILATING EQUIPMENT SHALL BE LOCATED NO MORE THAN 48 INCHES (1219 MM) MEASURED FROM THE TOP OF THE OUTLET BOX NOR LESS THAN 15 INCHES (381 MM) MEASURED FROM THE BOTTOM OF THE OUTLET BOX TO THE LEVEL OF THE FINISHED FLOOR OR WORKING PLATFORM.
5. REFER TO EQUIPMENT MANUFACTURER SPECS FOR ADDITIONAL OVER-CURRENT PROTECTIONS OTHER THAN THE BRANCH CIRCUIT BREAKER.
6. ALL WIRING IN DWELLINGS TO BE NONMETALLIC SHEATHED CABLES (ROMEX).
7. A THREE-WIRE PLUS GROUND BRANCH CIRCUIT IS REQUIRED FOR ALL 240V CIRCUITS SERVING COOKING EQUIPMENT AND CLOTHES DRYER.
8. PROVIDE WEATHER PROOF BOXES FOR ALL EXTERIOR SWITCHES AND CONTROLS.
9. ALL 120V-1PH-15A AND 20A BRANCH CIRCUITS SUPPLYING RECEPTACLES IN KITCHENS, FAMILY, DINNING, LIVING, DENS, BEDROOMS, CLOSETS, HALLWAYS, LAUNDRY AREAS OR SIMILAR ROOMS SHALL HAVE A LISTED ARC-PROTECTION CIRCUIT BREAKER INSTALLED IN COMBINATION WITH OUTLET BRANCH CIRCUIT TYPE ARC-FAULT CIRCUIT INTERRUPTER INSTALLED AT THE FIRST BOX. SEE SECTION 210.12(A)(3) FOR WIRING METHODS.
10. RECEPTACLES SHALL BE INSTALLED SUCH THAT NO POINT MEASURED HORIZONTALLY ALONG THE FLOOR LINE OF ANY WALL SPACE IS MORE THAN 6 FT FROM A RECEPTACLE OUTLET.
11. WATER HEATER SHALL USE A 120/240 VOLT 3 CONDUCTOR, 10 AWG COPPER BRANCH CIRCUIT, WITHIN 3 FEET FROM THE WATER HEATER AND ACCESSIBLE TO THE WATER HEATER WITH NO OBSTRUCTIONS.

24" X 36"

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD **CF1R-PRF-01E**

Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 1 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

GENERAL INFORMATION					
01	Project Name	Option # 1 Duplex Unit 2			
02	Run Title	Title 24 Analysis			
03	Project Location	Option # 1 Duplex Unit 2			
04	City	Fresno County	05	Standards Version	2022
06	Zip code		07	Software Version	EnergyPro 9.1
08	Climate Zone	13	09	Front Orientation (deg/ Cardinal)	All orientations
10	Building Type	Single family	11	Number of Dwelling Units	1
12	Project Scope	Newly Constructed	13	Number of Bedrooms	2
14	Addition Cond. Floor Area (ft²)	0	15	Number of Stories	1
16	Existing Cond. Floor Area (ft²)	n/a	17	Fenestration Average U-factor	0.3
18	Total Cond. Floor Area (ft²)	996	19	Glazing Percentage (%)	16.00%
20	ADU Bedroom Count	n/a			

COMPLIANCE RESULTS	
01	Building Complies with Computer Performance
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.
03	This building incorporates one or more Special Features shown below

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD **CF1R-PRF-01E**

Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 2 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

ENERGY DESIGN RATINGS	Energy Design Ratings			Compliance Margins		
	Source Energy (EDR1)	Efficiency[1] EDR (EDR2efficiency)	Total[2] EDR (EDR2total)	Source Energy (EDR1)	Efficiency[1] EDR (EDR2efficiency)	Total[2] EDR (EDR2total)
Standard Design	36.4	41.3	34.2			
Proposed Design						
North Facing	32.3	39	32.8	4.1	2.3	1.4
East Facing	32.9	41.2	34.1	3.5	0.1	0.1
South Facing	32.1	37.7	32.1	4.3	3.6	2.1
West Facing	32.7	40.9	34	3.7	0.4	0.2
RESULT[3]: PASS						

[1]Efficiency EDR includes improvements like a better building envelope and more efficient equipment
[2]Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries
[3]Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded

- Standard Design PV Capacity: 2.63 kWdc
- Proposed PV Capacity Scaling: North (2.63 kWdc) East (2.63 kWdc) South (2.63 kWdc) West (2.63 kWdc)

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Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 3 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

ENERGY USE SUMMARY						
Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft² -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft² -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft² -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft² -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	2.74	12.11	1.86	13.82	0.88	-1.71
Space Cooling	2.18	45.8	2.11	46.14	0.07	-0.34
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.41	15.13	0.7	6.84
Self Utilization/Flexibility Credit				0		0
North Facing Efficiency Compliance Total	**7.43**	**84.17**	**5.78**	**79.38**	**1.65**	**4.79**
Space Heating	2.74	12.11	1.97	14.76	0.77	-2.65
Space Cooling	2.18	45.8	2.23	49.71	-0.05	-3.91
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.42	15.13	0.69	6.84
Self Utilization/Flexibility Credit				0		0
East Facing Efficiency Compliance Total	**7.43**	**84.17**	**6.02**	**83.89**	**1.41**	**0.28**

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Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 4 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

ENERGY USE SUMMARY						
Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft² -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft² -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft² -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft² -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	2.74	12.11	1.9	14.13	0.84	-2.02
Space Cooling	2.18	45.8	1.97	43.48	0.21	2.32
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.4	14.96	0.71	7.01
Self Utilization/Flexibility Credit				0		0
South Facing Efficiency Compliance Total	**7.43**	**84.17**	**5.67**	**76.86**	**1.76**	**7.31**
Space Heating	2.74	12.11	1.86	13.82	0.88	-1.71
Space Cooling	2.18	45.8	2.29	50.3	-0.11	-4.5
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.39	14.94	0.72	7.03
Self Utilization/Flexibility Credit				0		0
West Facing Efficiency Compliance Total	**7.43**	**84.17**	**5.94**	**83.35**	**1.49**	**0.82**

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Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 5 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

ENERGY USE INTENSITY	Standard Design (kBtu/ft² - yr)	Proposed Design (kBtu/ft² - yr)	Compliance Margin (kBtu/ft² - yr)	Margin Percentage
North Facing				
Gross EUI[1]	23.24	20.5	2.74	11.79
Net EUI[2]	8.94	6.2	2.74	30.65
East Facing				
Gross EUI[1]	23.24	20.96	2.28	9.81
Net EUI[2]	8.94	6.67	2.27	25.39
South Facing				
Gross EUI[1]	23.24	20.35	2.89	12.44
Net EUI[2]	8.94	6.06	2.88	32.21
West Facing				
Gross EUI[1]	23.24	20.87	2.37	10.2
Net EUI[2]	8.94	6.57	2.37	26.51

Notes
1. Gross EUI is Energy Use Total (not including PV) / Total Building Area.
2. Net EUI is Energy Use Total (including PV) / Total Building Area.

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Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 6 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

REQUIRED PV SYSTEMS											
01	02	03	04	05	06	07	08	09	10	11	12
DC System Size (kWdc)	Exception	Module Type	Array Type	Power Electronics	CFI	Azimuth (deg)	Tilt Input	Array Angle (deg)	Tilt: (x in 12)	Inverter Eff. (%)	Annual Solar Access (%)
2.63	NA	Standard (14-17%)	Fixed	none	true	150-270	n/a	n/a	<=7:12	96	98

REQUIRED SPECIAL FEATURES

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

- Whole house fan
- Insulation below roof deck
- Window overhangs and/or fins
- Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed

HERS FEATURE SUMMARY

The following is a summary of the features that must be field-verified by a certified HERS Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the HERS Registry

- Quality insulation installation (QII)
- Indoor air quality ventilation
- Kitchen range hood
- Whole house fan airflow and fan efficacy
- Minimum Airflow
- Verified SEER/SEER2
- Verified Refrigerant Charge
- Fan Efficacy Watts/CFM
- Verified HSPF
- Verified heat pump rated heating capacity
- Duct leakage testing

BUILDING - FEATURES INFORMATION						
01	02	03	04	05	06	07
Project Name	Conditioned Floor Area (ft²)	Number of Dwelling Units	Number of Bedrooms	Number of Zones	Number of Ventilation Cooling Systems	Number of Water Heating Systems
Option # 1 Duplex Unit 2	996	1	2	1	1	1

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Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 7 of 15)**

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ZONE INFORMATION						
01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft²)	Avg. Ceiling Height	Water Heating System 1	Status
Living Area Unit 2	Conditioned	HVAC System1	996	8	DHW Sys 1	New

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft²)	Window and Door Area (ft2)	Tilt (deg)
Front Wall W	Living Area Unit 2	R-21 Wall + OS	0	Front	240	80.01	90
Rear Wall E	Living Area Unit 2	R-21 Wall + OS	180	Back	240	44.47	90
Right Wall S	Living Area Unit 2	R-21 Wall + OS	270	Right	152.96	34.4736	90
Interior Wall	Living Area Unit 2>>__Garage__	R-13 Wall	n/a	n/a	136	0	n/a
Interior Wall 2	Living Area Unit 2>>Living Area Unit 2	R-0 Wall_	n/a	n/a	288	0	n/a
Attic Roof	Living Area Unit 2	R-38 Roof Attic + R13 BRD	n/a	n/a	996	n/a	n/a
Attic Roof 2	__Garage__	R-0 Roof Attic	n/a	n/a	300	n/a	n/a
Front Wall W 2	__Garage__	R-0 Wall + OS	0	Front	96	62.37	90
Rear Wall E 2	__Garage__	R-0 Wall + OS	180	Back	96	0	90
Left Wall N	__Garage__	R-0 Wall + OS	90	Left	64	0	90
Right Wall S 2	__Garage__	R-0 Wall + OS	270	Right	200	0	90

ATTIC							
01	02	03	04	05	06	07	08
Name	Construction	Type	Roof Rise (x in 12)	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof
Attic __Garage__	Attic Garage Roof Cons	Ventilated	4	0.1	0.85	No	No
Attic Living Area Unit 2	Attic RoofLiving Area Unit 2	Ventilated	4	0.1	0.85	No	No

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD **CF1R-PRF-01E**

Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 8 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

FENESTRATION / GLAZING														
01	02	03	04	05	06	07	08	09	10	11	12	13	14	
Name	Type	Surface	Orientation	Azimuth	Width (ft)	Height (ft)	Mult.	Area (ft²)	U-factor	U-factor Source	SHGC	SHGC Source	Exterior Shading	
Door 1- 3068_	Window	Front Wall W	Front	0	3	6.67	1	20.01	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_ 2	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_ 3	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_ 4	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window B- 3026_	Window	Rear Wall E	Back	180			1	7.5	0.3	NFRC	0.23	NFRC	Bug Screen	
Window C- 2610_	Window	Rear Wall E	Back	180			1	2.5	0.3	NFRC	0.23	NFRC	Bug Screen	
Door 8B- 5861_	Window	Rear Wall E	Back	180			1	34.47	0.3	NFRC	0.23	NFRC	Bug Screen	
Door 3- 5861_	Window	Right Wall S	Right	270	5.67	6.08	1	34.47	0.3	NFRC	0.23	NFRC	Bug Screen	

OPAQUE DOORS			
01	02	03	04
Name	Side of Building	Area (ft²)	U-factor
Door 10- 90611_	Front Wall W 2	62.37	0.7

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CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD **CF1R-PRF-01E**

Project Name: Option # 1 Duplex Unit 2 **Calculation Date/Time:** 2023-06-23T21:48:22+05:30 **(Page 9 of 15)**

Calculation Description: Title 24 Analysis **Input File Name:** 2023_10 PROPOSED DUPLEX DWELLING UNIT_OPTION 1_Unit 2_MP_V9.1.ribd22x

OVERHANGS AND FINS													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Window	Overhang					Left Fin				Right Fin			
	Depth	Dist Up	Left Extent	Right Extent	Flap Ht.	Depth	Top Up	Dist L	Bot Up	Depth	Top Up	Dist R	Bot Up
Door 1- 3068_	9.7	1	9.7	9.7	0	0	0	0	0	0	0	0	0
Window A- 3050_	9.7	1	9.7	9.7	0	0	0	0	0	0	0	0	0
Window A- 3050_ 2	9.7	1	9.7	9.7	0	0	0	0	0	0	0	0	0
Window A- 3050_ 3	3.67	1	3.67	3.67	0	0	0	0	0	0	0	0	0
Window A- 3050_ 4	3.67	1	3.67	3.67	0	0	0	0	0	0	0	0	0
Door 3- 5861_	13.58	3	13.58	13.58	0	0	0	0	0	0	0	0	0

SLAB FLOORS							
01	02	03	04	05	06	07	08
Name	Zone	Area (ft²)	Perimeter (ft)	Edge Insul. R-value and Depth	Edge Insul. R-value and Depth	Carpeted Fraction	Heated
Slab-on-Grade	Living Area Unit 2	996	79.12	none	0	80%	No
Slab-on-Grade 2	__Garage__	300	57	none	0	0%	No

OPAQUE SURFACE CONSTRUCTIONS							
01	02	03	04	05	06	07	08
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Interior / Exterior Continuous R-value	U-factor	Assembly Layers
R-0 Wall + OS	Exterior Walls	Wood Framed Wall	2x6 @ 16 in. O. C.	R-0	None / None	0.343	Inside Finish: Gypsum Board Cavity / Frame: no insul. / 2x6 Exterior Finish: All Other Siding

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6/30/2023 2:52:05 PM
24" X 36"

DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT ROBINA R. WRIGHT NO. C-32283 RENEWAL DATE 08/30/2025 STATE OF CALIFORNIA

UPDATE

JUNE 29, 2023

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TITLE

TITLE 24 ENERGY COMPLIANCE

SCALE

T24-1.1

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

©

RESIDENTIAL MEASURES SUMMARY

RMS-1

Project Name	Building Type	Date
Option # 1 Duplex Unit 2	☑ Single Family ☐ Addition Alone ☐ Multi Family ☐ Existing+ Addition/Alteration	24-06-2023
Project Address	**California Energy Climate Zone**	**Total Cond. Floor Area**	**Addition**	**# of Units**
Option # 1 Duplex Unit 2 Fresno County	CA Climate Zone 13	996	n/a	1

INSULATION

Construction	Type	Cavity	Area (ft^2)	Special Features	Status
Wall	Wood Framed	R 20	474		New
Demising	Wood Framed	R 13	136		New
Demising	Wood Framed	- no insulation	288		New
Slab	Unheated Slab-on-Grade	- no insulation	996	Perim = 79'	New
Roof	Wood Framed Attic	R 38	996	Add=R-13.0	New

FENESTRATION

Total Area: 159 | Glazing Percentage: 16.0% | New/Altered Average U-Factor: 0.30

Orientation	Area(ft^2)	U-Fac	SHGC	Overhang	Sidefins	Exterior Shades	Status
Front (W)	20.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	3.7	none	N/A	New
Rear (E)	10.0	0.300	0.23	none	none	N/A	New
Rear (E)	34.5	0.300	0.23	none	none	N/A	New
Right (S)	34.5	0.300	0.23	13.6	none	N/A	New

HVAC SYSTEMS

Qty.	Heating	Min. Eff	Cooling	Min. Eff	Thermostat	Status
1	Electric Heat Pump	9.00 HSPF	Split Heat Pump	16.9 SEER	Setback	New

HVAC DISTRIBUTION

Location	Heating	Cooling	Duct Location	Duct R-Value	Status
HVAC System	Ducted	Ducted	Attic	8.0	New

WATER HEATING

Qty.	Type	Gallons	Min. Eff	Distribution	Status
1	Heat Pump	50	3.20	Standard	New

2022 Single-Family Residential Mandatory Requirements Summary

NOTE: Single-family residential buildings subject to the Energy Codes must comply with all applicable mandatory measures, regardless of the compliance approach used. Review the respective section for more information.
(04/2022)

Building Envelope:

§ 110.6(a)1:	**Air Leakage.** Manufactured fenestration, exterior doors, and exterior pet doors must limit air leakage to 0.3 CFM per square foot or less when tested per NFRC-400, ASTM E283, or AAMA/WDMA/CSA 101/I.S.2/A440-2011. *
§ 110.6(a)5:	**Labeling.** Fenestration products and exterior doors must have a label meeting the requirements of § 10-111(a).
§ 110.6(b):	**Field fabricated exterior doors and fenestration** products must use U-factors and solar heat gain coefficient (SHGC) values from Tables 110.6-A, 110.6-B, or JA4.5 for exterior doors. They must be caulked and/or weather-stripped. *
§ 110.7:	**Air Leakage.** All joints, penetrations, and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, or weather stripped.
§ 110.8(a):	**Insulation Certification by Manufacturers.** Insulation must be certified by the Department of Consumer Affairs, Bureau of Household Goods and Services (BHGS).
§ 110.8(g):	**Insulation Requirements for Heated Slab Floors.** Heated slab floors must be insulated per the requirements of § 110.8(g).
§ 110.8(i):	**Roofing Products Solar Reflectance and Thermal Emittance.** The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.8(i) and be labeled per §10-113 when the installation of a cool roof is specified on the CF1R.
§ 110.8(j):	**Radiant Barrier.** When required, radiant barriers must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.
§ 150.0(a):	**Roof Deck, Ceiling and Rafter Roof Insulation.** Roof decks in newly constructed attics in climate zones 4 and 8-16 area-weighted average U-factor not exceeding U-0.184. Ceiling and rafter roofs minimum R-22 insulation in wood-frame ceiling; or area-weighted average U-factor must not exceed 0.043. Rafter roof alterations minimum R-19 or area-weighted average U-factor of 0.054 or less. Attic access doors must have permanently attached insulation using adhesive or mechanical fasteners. The attic access must be gasketed to prevent air leakage. Insulation must be installed in direct contact with a roof or ceiling which is sealed to limit infiltration and exfiltration, as specified in § 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling. *
§ 150.0(b):	**Loose-fill Insulation.** Loose fill insulation must meet the manufacturer's required density for the labeled R-value.
§ 150.0(c):	**Wall Insulation.** Minimum R-13 insulation in 2x4 inch wood framing wall or have a U-factor of 0.102 or less, or for R-20 in 2x6 inch wood framing or have a U-factor of 0.071 or less. Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102. Masonry walls must meet Tables 150.1-A or B. *
§ 150.0(d):	**Raised-floor Insulation.** Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor. *
§ 150.0(f):	**Slab Edge Insulation.** Slab edge insulation must meet all of the following: have a water absorption rate, for the insulation material alone without facings, no greater than 0.3 percent; have a water vapor permeance no greater than 2.0 perm per inch; be protected from physical damage and UV light deterioration; and, when installed as part of a heated slab floor, meet the requirements of § 110.8(g).
§ 150.0(g)1:	**Vapor Retarder.** In climate zones 1 through 16, the earth floor of unvented crawl space must be covered with a Class I or Class II vapor retarder. This requirement also applies to controlled ventilation crawl space for buildings complying with the exception to §150.0(d).
§ 150.0(g)2:	**Vapor Retarder.** In climate zones 14 and 16, a Class I or Class II vapor retarder must be installed on the conditioned space side of all insulation in all exterior walls, vented attics, and unvented attics with air-permeable insulation.
§ 150.0(q):	**Fenestration Products.** Fenestration, including skylights, separating conditioned space from unconditioned space or outdoors must have a maximum U-factor of 0.45; or area-weighted average U-factor of all fenestration must not exceed 0.45.

Fireplaces, Decorative Gas Appliances, and Gas Log:

§ 110.5(e)	**Pilot Light.** Continuously burning pilot lights are not allowed for indoor and outdoor fireplaces.
§ 150.0(e)1:	**Closable Doors.** Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.
§ 150.0(e)2:	**Combustion Intake.** Masonry or factory-built fireplaces must have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper or combustion-air control device. *
§ 150.0(e)3:	**Flue Damper.** Masonry or factory-built fireplaces must have a flue damper with a readily accessible control. *

Space Conditioning, Water Heating, and Plumbing System:

§ 110.0-§ 110.3:	**Certification.** Heating, ventilation, and air conditioning (HVAC) equipment, water heaters, showerheads, faucets, and all other regulated appliances must be certified by the manufacturer to the California Energy Commission. *
§ 110.2(a):	**HVAC Efficiency.** Equipment must meet the applicable efficiency requirements in Table 110.2-A through Table 110.2-N. *
§ 110.2(b):	**Controls for Heat Pumps with Supplementary Electric Resistance Heaters.** Heat pumps with supplementary electric resistance heaters must have controls that prevent supplementary heater operation when the heating load can be met by the heat pump alone; and in which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.
§ 110.2(c):	**Thermostats.** All heating or cooling systems not controlled by a central energy management control system (EMCS) must have a setback thermostat. *
§ 110.3(c)3:	**Insulation.** Unfired service water heater storage tanks and solar water-heating backup tanks must have adequate insulation, or tank surface heat loss rating.
§ 110.3(c)6:	**Isolation Valves.** Instantaneous water heaters with an input rating greater than 6.8 kBtu per hour (2 kW) must have isolation valves with hose bibbs or other fittings on both cold and hot water lines to allow for flushing the water heater when the valves are closed.

2022 Single-Family Residential Mandatory Requirements Summary

§ 110.5:	**Pilot Lights.** Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces; household cooking appliances (except appliances without an electrical supply voltage connection with pilot lights that consume less than 150 Btu per hour); and pool and spa heaters. *
§ 150.0(h)1:	**Building Cooling and Heating Loads.** Heating and/or cooling loads are calculated in accordance with the ASHRAE Handbook, Equipment Volume, Applications Volume, and Fundamentals Volume; the SMACNA Residential Comfort System Installation Standards Manual; or the ACCA Manual J using design conditions specified in § 150.0(h)2.
§ 150.0(h)3A:	**Clearances.** Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 150.0(h)3B:	**Liquid Line Drier.** Air conditioners and heat pump systems must be equipped with liquid line filter driers if required, as specified by the manufacturer's instructions.
§ 150.0(j)1:	**Water Piping, Solar Water-heating System Piping, and Space Conditioning System Line Insulation.** All domestic hot water piping must be insulated as specified in § 609.11 of the California Plumbing Code. *
§ 150.0(j)2:	**Insulation Protection.** Piping insulation must be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind as required by §120.3(b). Insulation exposed to weather must be water retardant and protected from UV light (no adhesive tapes). Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space must include, or be protected by, a Class I or Class II vapor retarder. Pipe insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve.
§ 150.0(n)1:	**Gas or Propane Water Heating Systems.** Systems using gas or propane water heaters to serve individual dwelling units must designate a space at least 2.5' x 2.5' x 7' suitable for the future installation of a heat pump water heater, and meet electrical and plumbing requirements, based on the distance between this designated space and the water heater location; and a condensate drain no more than 2" higher than the base of the water heater
§ 150.0(n)3:	**Solar Water-heating Systems.** Solar water-heating systems and collectors must be certified and rated by the Solar Rating and Certification Corporation (SRCC), the International Association of Plumbing and Mechanical Officials, Research and Testing (IAPMO R&T), or by a listing agency that is approved by the executive director.

Ducts and Fans:

§ 110.8(d)3:	**Ducts.** Insulation installed on an existing space-conditioning duct must comply with § 604.0 of the California Mechanical Code (CMC). If a contractor installs the insulation, the contractor must certify to the customer, in writing, that the insulation meets this requirement.
§ 150.0(m)1:	**CMC Compliance.** All air-distribution system ducts and plenums must meet CMC §§ 601.0-605.0 and ANSI/SMACNA-006-2006 HVAC Duct Construction Standards Metal and Flexible 3rd Edition. Portions of supply-air and return-air ducts and plenums must be insulated to R-6.0 or higher; ducts located entirely in conditioned space as confirmed through field verification and diagnostic testing (RA3.1.4.3.8) do not require insulation. Connections of metal ducts and inner core of flexible ducts must be mechanically fastened. Openings must be sealed with mastic, tape, or other duct-closure system that meets the applicable UL requirements, or aerosol sealant that meets UL 723. The combination of mastic and either mesh or tape must be used to seal openings greater than ¼", if mastic or tape is used. Building cavities, air handler support platforms, and plenums designed or constructed with materials other than sealed sheet metal, duct board or flexible duct must not be used to convey conditioned air. Building cavities and support platforms may contain ducts; ducts installed in these spaces must not be compressed. *
§ 150.0(m)2:	**Factory-Fabricated Duct Systems.** Factory-fabricated duct systems must comply with applicable requirements for duct construction, connections, and closures; joints and seams of duct systems and their components must not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.
§ 150.0(m)3:	**Field-Fabricated Duct Systems.** Field-fabricated duct systems must comply with applicable requirements for: pressure-sensitive tapes, mastics, sealants, and other requirements specified for duct construction.
§ 150.0(m)7:	**Backdraft Damper.** Fan systems that exchange air between the conditioned space and outdoors must have backdraft or automatic dampers.
§ 150.0(m)8:	**Gravity Ventilation Dampers.** Gravity ventilating systems serving conditioned space must have either automatic or readily accessible, manually operated dampers in all openings to the outside, except combustion inlet and outlet air openings and elevator shaft vents.
§ 150.0(m)9:	**Protection of Insulation.** Insulation must be protected from damage due tosunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather must be suitable for outdoor service (e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover). Cellular foam insulation must be protected as above or painted with a water retardant and solar radiation-resistant coating.
§ 150.0(m)10:	**Porous Inner Core Flex Duct.** Porous inner cores of flex ducts must have a non-porous layer or air barrier between the inner core and outer vapor barrier.
§ 150.0(m)11:	**Duct System Sealing and Leakage Test.** When space conditioning systems use forced air duct systems to supply conditioned air to an occupiable space, the ducts must be sealed and duct leakage tested, as confirmed through field verification and diagnostic testing, in accordance with Reference Residential Appendix RA3.1.
§ 150.0(m)12:	**Air Filtration.** Space conditioning systems with ducts exceeding 10 feet and the supply side of ventilation systems must have MERV 13 or equivalent filters. Filters for space conditioning systems must have a two inch depth or can be one inch if sized per Equation 150.0-A. Clean-filter pressure drop and labeling must meet the requirements in §150.0(m)12. Filters must be accessible for regular service. Filter racks or grilles must use gaskets, sealing, or other means to close gaps around the inserted filters to and prevents air from bypassing the filter. *

2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(m)13:	**Space Conditioning System Airflow Rate and Fan Efficacy.** Space conditioning systems that use ducts to supply cooling must have a hole for the placement of a static pressure probe, or a permanently installed static pressure probe in the supply plenum. Airflow must be ≥ 350 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.45 watts per CFM for gas furnace air handlers and ≤ 0.58 watts per CFM for all others. Small duct high velocity systems must provide an airflow ≥ 250 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.62 watts per CFM. Field verification testing is required in accordance with Reference Residential Appendix RA3.3. *

Ventilation and Indoor Air Quality:

§ 150.0(o)1:	**Requirements for Ventilation and Indoor Air Quality.** All dwelling units must meet the requirements of ASHRAE Standard 62.2, Ventilation and Acceptable Indoor Air Quality in Residential Buildings subject to the amendments specified in § 150.0(o)1. *
§ 150.0(o)1B:	**Central Fan Integrated (CFI) Ventilation Systems.** Continuous operation of CFI air handler is not allowed to provide the whole-dwelling unit ventilation airflow required per §150.0(o)1C. A motorized damper(s) must be installed on the ventilation duct(s) that prevents all airflow through the space conditioning duct system when the damper(s) is closed andcontrolled per §150.0(o)1Biii&iv. CFI ventilation systems must have controls that track outdoor air ventilation run time, and either open or close the motorized damper(s) for compliance with §150.0(o)1C.
§ 150.0(o)1C:	**Whole-Dwelling Unit Mechanical Ventilation for Single-Family Detached and townhouses .** Single-family detached dwelling units, and attached dwelling units not sharing ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces must have mechanical ventilation airflow specified in § 150.0(o)1Ci-iii.
§ 150.0(o)1G:	**Local Mechanical Exhaust.** Kitchens and bathrooms must have local mechanical exhaust; nonenclosed kitchens must have demand-controlled exhaust system meeting requirements of §150.0(o)1Gii,enclosed kitchens and bathrooms can use demand-controlled or continuous exhaust meeting §150.0(o)1Giii-iv. Airflow must be measured by the installer per §150.0(o)1Gv, and rated for sound per §150.0(o)1Gvi. *
§ 150.0(o)1H&I:	**Airflow Measurement and Sound Ratings of Whole-Dwelling Unit Ventilation Systems.** The airflow required per § 150.0(o)1C must be measured by using a flow hood, flow grid, or other airflow measuring device at the fan's inlet or outlet terminals/grilles per Reference Residential Appendix RA3.7. Whole-Dwelling unit ventilation systems must be rated for sound per ASHRAE 62.2 §7.2 at no less than the minimum airflow rate required by §150.0(o)1C.
§ 150.0(o)2:	**Field Verification and Diagnostic Testing.** Whole-Dwelling Unit ventilation airflow, vented range hood airflow and sound rating, and HRV and ERV fan efficacy must be verified in accordance with Reference Residential Appendix RA3.7. Vented range hoods must be verified per Reference Residential Appendix RA3.7.4.3 to confirm if it is rated by HVI or AHAM to comply with the airflow rates and sound requirements per §150.0(o)1G

Pool and Spa Systems and Equipment:

§ 110.4(a):	**Certification by Manufacturers.** Any pool or spa heating system or equipment must be certified to have all of the following: compliance with the Appliance Efficiency Regulations and listing in MAEDbS; an on-off switch mounted outside of the heater that allows shutting off the heater without adjusting the thermostat setting; a permanent weatherproof plate or card with operating instructions; and must not use electric resistance heating. *
§ 110.4(b)1:	**Piping.** Any pool or spa heating system or equipment must be installed with at least 36 inches of pipe between the filter and the heater, or dedicated suction and return lines, or built-in or built-up connections to allow for future solar heating.
§ 110.4(b)2:	**Covers.** Outdoor pools or spas that have a heat pump or gas heater must have a cover.
§ 110.4(b)3:	**Directional Inlets and Time Switches for Pools.** Pools must have directional inlets that adequately mix the pool water, and a time switch that will allow all pumps to be set or programmed to run only during off-peak electric demand periods.
§ 110.5:	**Pilot Light.** Natural gas pool and spa heaters must not have a continuously burning pilot light.
§ 150.0(p):	**Pool Systems and Equipment Installation.** Residential pool systems or equipment must meet the specified requirements for pump sizing, flow rate, piping, filters, and valves.

Lighting:

§ 110.9:	**Lighting Controls and Components.** All lighting control devices and systems, ballasts, and luminaires must meet the applicable requirements of § 110.9. *
§ 150.0(k)1A:	**Luminaire Efficacy.** All installed luminaires must meet the requirements in Table 150.0-A, except lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, and garage door openers; navigation lighting less than 5 watts; and lighting internal to drawers, cabinets, and linen closets with an efficacy of at least 45 lumens per watt.
§ 150.0(k)1B:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1C:	**Recessed Downlight Luminaires in Ceilings.** Luminaires recessed into ceilings must not contain screw based sockets, must be airtight, and must be sealed with a gasket or caulk. California Electrical Code § 410.116 must also be met.
§ 150.0(k)1D:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1E:	**Blank Electrical Boxes.** The number of electrical boxes that are more than five feet above the finished floor and do not contain a luminaire or other device shall be no more than the number of bedrooms. These boxes must be served by a dimmer, vacancy sensor control, low voltage wiring, or fan speed control.
§ 150.0(k)1F:	**Lighting Integral to Exhaust Fans.** Lighting integral to exhaust fans (except when installed by the manufacturer in kitchen exhaust hoods) must meet the applicable requirements of § 150.0(k). *

2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(k)1G:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1H:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1I:	**Light Sources in Drawers, Cabinets, and Linen Closets.** Light sources internal to drawers, cabinetry or linen closets are not required to comply with Table 150.0-A or be controlled by vacancy sensors provided that they are rated to consume no more than 5 watts of power, emit no more than 150 lumens, and are equipped with controls that automatically turn the lighting off when the drawer, cabinet or linen closet is closed.
§ 150.0(k)2A:	**Interior Switches and Controls.** All forward phase cut dimmers used with LED light sources must comply with NEMA SSL 7A.
§ 150.0(k)2B:	**Interior Switches and Controls.** Exhaust fans must be controlled separately from lighting systems. *
§ 150.0(k)2A:	**Accessible Controls.** Lighting must have readily accessible wall-mounted controls that allow the lighting to be manually turned on and off. *
§ 150.0(k)2B:	**Multiple Controls.** Controls must not bypass a dimmer, occupant sensor, or vacancy sensor function if the dimmer or sensor is installed to comply with § 150.0(k).
§ 150.0(k)2C:	**Mandatory Requirements.** Lighting controls must comply with the applicable requirements of § 110.9.
§ 150.0(k)2D:	**Energy Management Control Systems.** An energy management control system (EMCS) may be used to comply with dimming, occupancy, and control requirements if it provides the functionality of the specified control per § 110.9 and the physical controls specified in § 150.0(k)2A.
§ 150.0(k)2E:	**Automatic Shutoff Controls.** In bathrooms, garages, laundry rooms, utility rooms and walk-in closets, at least one installed luminaire must be controlled by an occupancy or vacancy sensor providing automatic-off functionality. Lighting inside drawers and cabinets with opaque fronts or doors must have controls that turn the light off when the drawer or door is closed.
§ 150.0(k)2F:	**Dimmers.** Lighting in habitable spaces (e.g., living rooms, dining rooms, kitchens, and bedrooms) must have readily accessible wall-mounted dimming controls that allow the lighting to be manually adjusted up and down. Forward phase cut dimmers controlling LED light sources in these spaces must comply with NEMA SSL 7A.
§ 150.0(k)2K:	**Independent controls.** Integrated lighting of exhaust fans shall be controlled independently from the fans. Lighting under cabinets or shelves, lighting in display cabinets, and switched outlets must be controlled separately from ceiling-installed lighting.
§ 150.0(k)3A:	**Residential Outdoor Lighting.** For single-family residential buildings, outdoor lighting permanently mounted to a residential building, or to other buildings on the same lot, must have a manual on/off switch and either a photocell and motion sensor or automatic time switch control) or an astronomical time clock. An energy management control system that provides the specified control functionality and meets all applicable requirements may be used to meet these requirements.
§ 150.0(k)4:	**Internally illuminated address signs.** Internally illuminated address signs must either comply with § 140.8 or consume no more than 5 watts of power.
§ 150.0(k)5:	**Residential Garages for Eight or More Vehicles.** Lighting for residential parking garages for eight or more vehicles must comply with the applicable requirements for nonresidential garages in §§ 110.9, 130.0, 130.1, 130.4, 140.6, and 141.0.

Solar Readiness:

§ 110.10(a)1:	**Single-family Residences.** Single-family residences located in subdivisions with 10 or more single-family residences and where the application for a tentative subdivision map for the residences has been deemed complete and approved by the enforcement agency, which do not have a photovoltaic system installed, must comply with the requirements of § 110.10(b)-(e).
§110.10(b)1A:	**Minimum Solar Zone Area.** The solar zone must have a minimum total area as described below. The solar zone must comply with access, pathway, smoke ventilation, and spacing requirements as specified in Title 24, Part 9 or other parts of Title 24 or in any requirements adopted by a local jurisdiction. The solar zone total area must be comprised of areas that have no dimension less than 5 feet and are no less than 80 square feet each for buildings with roof areas less than or equal to 10,000 square feet or no less than 160 square feet each for buildings with roof areas greater than 10,000 square feet. For single-family residences, the solar zone must be located on the roof or overhang of the building and have a total area no less than 250 square feet. *
§ 110.10(b)2:	**Azimuth.** All sections of the solar zone located on steep-sloped roofs must have an azimuth between 90-300° of true north.
§ 110.10(b)3A:	**Shading.** The solar zone must not contain any obstructions, including but not limited to: vents, chimneys, architectural features, and roof mounted equipment.
§ 110.10(b)3B:	**Shading.** Any obstruction located on the roof or any other part of the building that projects above a solar zone must be located at least twice the horizontal distance of the height difference between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone, measured in the vertical plane. *
§ 110.10(b)4:	**Structural Design Loads on Construction Documents.** For areas of the roof designated as a solar zone, the structural design loads for roof dead load and roof live load must be clearly indicated on the construction documents.
§ 110.10(c):	**Interconnection Pathways.** The construction documents must indicate: a location reserved for inverters and metering equipment and a pathway reserved for routing of conduit from the solar zone to the point of interconnection with the electrical service; and for single-family residences and central water-heating systems, a pathway reserved for routing plumbing from the solar zone to the water-heating system.
§ 110.10(d):	**Documentation.** A copy of the construction documents or a comparable document indicating the information from § 110.10(b)-(c) must be provided to the occupant.
§ 110.10(e)1:	**Main Electrical Service Panel.** The main electrical service panel must have a minimum busbar rating of 200 amps.
§ 110.10(e)2:	**Main Electrical Service Panel.** The main electrical service panel must have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space must be permanently marked as "For Future Solar Electric."

Electric and Energy Storage Ready:

2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(s)	**Energy Storage System (ESS) Ready.** All single-family residences must meet all of the following: Either ESS-ready interconnection equipment with backed up capacity of 60 amps or more and four or more ESS supplied branch circuits, or a dedicated raceway from the main service to a subpanel that supplies the branch circuits in § 150.0(s); at least four branch circuits must be identified and have their source collocated at a single panelboard suitable to be supplied by the ESS, with one circuit supplying the refrigerator, one lighting circuit near the primary exit, and one circuit supplying a sleeping room receptacle outlet; main panelboard must have a minimum busbar rating of 225 amps; sufficient space must be reserved to allow future installation of a system isolation equipment/transfer switch within 3' of the main panelboard, with raceways installed between the panelboard and the switch location to allow the connection of backup power source.
§ 150.0(t)	**Heat Pump Space Heater Ready.** Systems using gas or propane furnaces to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the furnace with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use." *
§ 150.0(u)	**Electric Cooktop Ready.** Systems using gas or propane cooktop to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the cooktop with circuit conductors rated at least 50 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use." *
§ 150.0(v)	**Electric Clothes Dryer Ready.** Clothes dryer locations with gas or propane plumbing to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the dryer location with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."

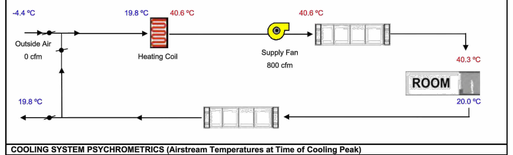
*Exceptions may apply.

HVAC SYSTEM HEATING AND COOLING LOADS SUMMARY

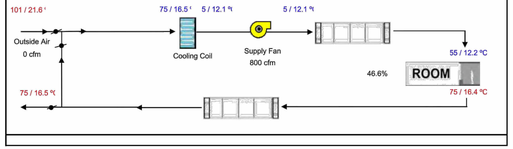
Project Name	Date
Option # 1 Duplex Unit 2	24-06-2023
System Name	**Floor Area**
HVAC System	996

ENGINEERING CHECKS		SYSTEM LOAD	COIL COOLING PEAK CFM	Sensible	Latent	COIL HTG. PEAK CFM	Sensible
Number of Systems	1						
Heating System							
Output per System	30,000	Total Room Loads	422	8,793	494	243	9,490
Total Output (Btuh)	30,000	Return Vented Lighting		0			
Output (Btuh/sqft)	30.1	Return Air Ducts		405			371
Cooling System		Return Fan		0			0
Output per System	27,000	Ventilation	0	0	0	0	0
Total Output (Btuh)	27,000	Supply Fan		0			0
Total Output (Tons)	2.3	Supply Air Ducts		405			371
Total Output (Btuh/sqft)	27.1						
Total Output (sqft/Ton)	442.7	TOTAL SYSTEM LOAD		9,604	494		10,231
Air System							
CFM per System	800	HVAC EQUIPMENT SELECTION					
Airflow (cfm)	800	LH248HV4		23,096	974		17,721
Airflow (cfm/sqft)	0.80						
Airflow (cfm/Ton)	355.6						
Outside Air (%)	0.0%	Total Adjusted System Output (Adjusted for Peak Design conditions)		23,096	974		17,721
Outside Air (cfm/sqft)	0.00						
Note: values above given at ARI conditions		TIME OF SYSTEM PEAK		Aug 3 PM			Jan 1 AM

HEATING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Heating Peak)



COOLING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Cooling Peak)



DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT — ROBIN R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JUNE 29, 2023

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TITLE

TITLE 24 ENERGY COMPLIANCE

SCALE

T24-1.2

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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Author	Checker

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GENERAL INFORMATION					
01	Project Name	Option # 1 Duplex Unit 2			
02	Run Title	Title 24 Analysis			
03	Project Location	Option # 1 Duplex Unit 2			
04	City	Fresno County	05	Standards Version	2022
06	Zip code		07	Software Version	EnergyPro 9.1
08	Climate Zone	13	09	Front Orientation (deg/ Cardinal)	All orientations
10	Building Type	Single family	11	Number of Dwelling Units	1
12	Project Scope	Newly Constructed	13	Number of Bedrooms	2
14	Addition Cond. Floor Area (ft²)	0	15	Number of Stories	1
16	Existing Cond. Floor Area (ft²)	n/a	17	Fenestration Average U-factor	0.3
18	Total Cond. Floor Area (ft²)	996	19	Glazing Percentage (%)	16.00%
20	ADU Bedroom Count	n/a			

COMPLIANCE RESULTS	
01	Building Complies with Computer Performance
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.
03	This building incorporates one or more Special Features shown below

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ENERGY DESIGN RATINGS	Energy Design Ratings			Compliance Margins		
	Source Energy (EDR1)	Efficiency[1] EDR (EDR2efficiency)	Total[2] EDR (EDR2total)	Source Energy (EDR1)	Efficiency[1] EDR (EDR2efficiency)	Total[2] EDR (EDR2total)
Standard Design	36.4	41.3	34.2			
Proposed Design						
North Facing	32.3	39	32.8	4.1	2.3	1.4
East Facing	32.9	41.2	34.1	3.5	0.1	0.1
South Facing	32.1	37.7	32.1	4.3	3.6	2.1
West Facing	32.7	40.9	34	3.7	0.4	0.2
RESULT[3]: PASS						

[1]Efficiency EDR includes improvements like a better building envelope and more efficient equipment
[2]Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries
[3]Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded

- Standard Design PV Capacity: 2.63 kWdc
- Proposed PV Capacity Scaling: North (2.63 kWdc) East (2.63 kWdc) South (2.63 kWdc) West (2.63 kWdc)

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ENERGY USE SUMMARY						
Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft² -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft² -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft² -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft² -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	2.74	12.11	1.86	13.82	0.88	-1.71
Space Cooling	2.18	45.8	2.11	46.14	0.07	-0.34
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.41	15.13	0.7	6.84
Self Utilization/Flexibility Credit				0		0
North Facing Efficiency Compliance Total	**7.43**	**84.17**	**5.78**	**79.38**	**1.65**	**4.79**
Space Heating	2.74	12.11	1.97	14.76	0.77	-2.65
Space Cooling	2.18	45.8	2.23	49.71	-0.05	-3.91
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.42	15.13	0.69	6.84
Self Utilization/Flexibility Credit				0		0
East Facing Efficiency Compliance Total	**7.43**	**84.17**	**6.02**	**83.89**	**1.41**	**0.28**

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ENERGY USE SUMMARY						
Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft² -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft² -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft² -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft² -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	2.74	12.11	1.9	14.13	0.84	-2.02
Space Cooling	2.18	45.8	1.97	43.48	0.21	2.32
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.4	14.96	0.71	7.01
Self Utilization/Flexibility Credit				0		0
South Facing Efficiency Compliance Total	**7.43**	**84.17**	**5.67**	**76.86**	**1.76**	**7.31**
Space Heating	2.74	12.11	1.86	13.82	0.88	-1.71
Space Cooling	2.18	45.8	2.29	50.3	-0.11	-4.5
IAQ Ventilation	0.4	4.29	0.4	4.29	0	0
Water Heating	2.11	21.97	1.39	14.94	0.72	7.03
Self Utilization/Flexibility Credit				0		0
West Facing Efficiency Compliance Total	**7.43**	**84.17**	**5.94**	**83.35**	**1.49**	**0.82**

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ENERGY USE INTENSITY	Standard Design (kBtu/ft² - yr)	Proposed Design (kBtu/ft² - yr)	Compliance Margin (kBtu/ft² - yr)	Margin Percentage
North Facing				
Gross EUI[1]	23.24	20.5	2.74	11.79
Net EUI[2]	8.94	6.2	2.74	30.65
East Facing				
Gross EUI[1]	23.24	20.96	2.28	9.81
Net EUI[2]	8.94	6.67	2.27	25.39
South Facing				
Gross EUI[1]	23.24	20.35	2.89	12.44
Net EUI[2]	8.94	6.06	2.88	32.21
West Facing				
Gross EUI[1]	23.24	20.87	2.37	10.2
Net EUI[2]	8.94	6.57	2.37	26.51

Notes
1. Gross EUI is Energy Use Total (not including PV) / Total Building Area.
2. Net EUI is Energy Use Total (including PV) / Total Building Area.

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REQUIRED PV SYSTEMS											
01	02	03	04	05	06	07	08	09	10	11	12
DC System Size (kWdc)	Exception	Module Type	Array Type	Power Electronics	CFI	Azimuth (deg)	Tilt Input	Array Angle (deg)	Tilt: (x in 12)	Inverter Eff. (%)	Annual Solar Access (%)
2.63	NA	Standard (14-17%)	Fixed	none	true	150-270	n/a	n/a	<=7:12	96	98

REQUIRED SPECIAL FEATURES

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

- Whole house fan
- Insulation below roof deck
- Window overhangs and/or fins
- Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed

HERS FEATURE SUMMARY

The following is a summary of the features that must be field-verified by a certified HERS Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered CF2Rs and CF3Rs are required to be completed in the HERS Registry

- Quality insulation installation (QII)
- Indoor air quality ventilation
- Kitchen range hood
- Whole house fan airflow and fan efficacy
- Minimum Airflow
- Verified SEER/SEER2
- Verified Refrigerant Charge
- Fan Efficacy Watts/CFM
- Verified HSPF
- Verified heat pump rated heating capacity
- Duct leakage testing

BUILDING - FEATURES INFORMATION						
01	02	03	04	05	06	07
Project Name	Conditioned Floor Area (ft²)	Number of Dwelling Units	Number of Bedrooms	Number of Zones	Number of Ventilation Cooling Systems	Number of Water Heating Systems
Option # 1 Duplex Unit 2	996	1	2	1	1	1

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ZONE INFORMATION						
01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft²)	Avg. Ceiling Height	Water Heating System 1	Status
Living Area Unit 2	Conditioned	HVAC System1	996	8	DHW Sys 1	New

OPAQUE SURFACES							
01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft²)	Window and Door Area (ft2)	Tilt (deg)
Front Wall W	Living Area Unit 2	R-21 Wall + OS	0	Front	240	80.01	90
Rear Wall E	Living Area Unit 2	R-21 Wall + OS	180	Back	240	44.47	90
Right Wall S	Living Area Unit 2	R-21 Wall + OS	270	Right	152.96	34.4736	90
Interior Wall	Living Area Unit 2>>__Garage__	R-13 Wall	n/a	n/a	136	0	n/a
Interior Wall 2	Living Area Unit 2>>Living Area Unit 2	R-0 Wall_	n/a	n/a	288	0	n/a
Attic Roof	Living Area Unit 2	R-38 Roof Attic + R13 BRD	n/a	n/a	996	n/a	n/a
Attic Roof 2	__Garage__	R-0 Roof Attic	n/a	n/a	300	n/a	n/a
Front Wall W 2	__Garage__	R-0 Wall + OS	0	Front	96	62.37	90
Rear Wall E 2	__Garage__	R-0 Wall + OS	180	Back	96	0	90
Left Wall N	__Garage__	R-0 Wall + OS	90	Left	64	0	90
Right Wall S 2	__Garage__	R-0 Wall + OS	270	Right	200	0	90

ATTIC							
01	02	03	04	05	06	07	08
Name	Construction	Type	Roof Rise (x in 12)	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof
Attic __Garage__	Attic Garage Roof Cons	Ventilated	4	0.1	0.85	No	No
Attic Living Area Unit 2	Attic RoofLiving Area Unit 2	Ventilated	4	0.1	0.85	No	No

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FENESTRATION / GLAZING														
01	02	03	04	05	06	07	08	09	10	11	12	13	14	
Name	Type	Surface	Orientation	Azimuth	Width (ft)	Height (ft)	Mult.	Area (ft²)	U-factor	U-factor Source	SHGC	SHGC Source	Exterior Shading	
Door 1- 3068_	Window	Front Wall W	Front	0	3	6.67	1	20.01	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_ 2	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_ 3	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window A- 3050_ 4	Window	Front Wall W	Front	0	3	5	1	15	0.3	NFRC	0.23	NFRC	Bug Screen	
Window B- 3026_	Window	Rear Wall E	Back	180			1	7.5	0.3	NFRC	0.23	NFRC	Bug Screen	
Window C- 2610_	Window	Rear Wall E	Back	180			1	2.5	0.3	NFRC	0.23	NFRC	Bug Screen	
Door 8B- 5861_	Window	Rear Wall E	Back	180			1	34.47	0.3	NFRC	0.23	NFRC	Bug Screen	
Door 3- 5861_	Window	Right Wall S	Right	270	5.67	6.08	1	34.47	0.3	NFRC	0.23	NFRC	Bug Screen	

OPAQUE DOORS			
01	02	03	04
Name	Side of Building	Area (ft²)	U-factor
Door 10- 90611_	Front Wall W 2	62.37	0.7

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OVERHANGS AND FINS													
01	02	03	04	05	06	07	08	09	10	11	12	13	14
Window	Overhang					Left Fin				Right Fin			
	Depth	Dist Up	Left Extent	Right Extent	Flap Ht.	Depth	Top Up	Dist L	Bot Up	Depth	Top Up	Dist R	Bot Up
Door 1- 3068_	9.7	1	9.7	9.7	0	0	0	0	0	0	0	0	0
Window A- 3050_	9.7	1	9.7	9.7	0	0	0	0	0	0	0	0	0
Window A- 3050_ 2	9.7	1	9.7	9.7	0	0	0	0	0	0	0	0	0
Window A- 3050_ 3	3.67	1	3.67	3.67	0	0	0	0	0	0	0	0	0
Window A- 3050_ 4	3.67	1	3.67	3.67	0	0	0	0	0	0	0	0	0
Door 3- 5861_	13.58	3	13.58	13.58	0	0	0	0	0	0	0	0	0

SLAB FLOORS							
01	02	03	04	05	06	07	08
Name	Zone	Area (ft²)	Perimeter (ft)	Edge Insul. R-value and Depth	Edge Insul. R-value and Depth	Carpeted Fraction	Heated
Slab-on-Grade	Living Area Unit 2	996	79.12	none	0	80%	No
Slab-on-Grade 2	__Garage__	300	57	none	0	0%	No

OPAQUE SURFACE CONSTRUCTIONS							
01	02	03	04	05	06	07	08
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Interior / Exterior Continuous R-value	U-factor	Assembly Layers
R-0 Wall + OS	Exterior Walls	Wood Framed Wall	2x6 @ 16 in. O. C.	R-0	None / None	0.343	Inside Finish: Gypsum Board Cavity / Frame: no insul. / 2x6 Exterior Finish: All Other Siding

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DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT ROBINA R. WRIGHT NO. C-32283 RENEWAL DATE 08/30/2025 STATE OF CALIFORNIA

UPDATE

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TITLE 24 ENERGY COMPLIANCE

SCALE

T24-2.1

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
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RESIDENTIAL MEASURES SUMMARY

RMS-1

Project Name	Building Type	Date
Option # 1 Duplex Unit 2	☑ Single Family ☐ Addition Alone ☐ Multi Family ☐ Existing+ Addition/Alteration	24-06-2023
Project Address	**California Energy Climate Zone**	**Total Cond. Floor Area**	**Addition**	**# of Units**
Option # 1 Duplex Unit 2 Fresno County	CA Climate Zone 13	996	n/a	1

INSULATION

Construction	Type	Cavity	Area (ft^2)	Special Features	Status
Wall	Wood Framed	R 20	474		New
Demising	Wood Framed	R 13	136		New
Demising	Wood Framed	- no insulation	288		New
Slab	Unheated Slab-on-Grade	- no insulation	996	Perim = 79'	New
Roof	Wood Framed Attic	R 38	996	Add=R-13.0	New

FENESTRATION

Total Area: 159 | Glazing Percentage: 16.0% | New/Altered Average U-Factor: 0.30

Orientation	Area(ft^2)	U-Fac	SHGC	Overhang	Sidefins	Exterior Shades	Status
Front (W)	20.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	3.7	none	N/A	New
Rear (E)	10.0	0.300	0.23	none	none	N/A	New
Rear (E)	34.5	0.300	0.23	none	none	N/A	New
Right (S)	34.5	0.300	0.23	13.6	none	N/A	New

HVAC SYSTEMS

Qty.	Heating	Min. Eff	Cooling	Min. Eff	Thermostat	Status
1	Electric Heat Pump	9.00 HSPF	Split Heat Pump	16.9 SEER	Setback	New

HVAC DISTRIBUTION

Location	Heating	Cooling	Duct Location	Duct R-Value	Status
HVAC System	Ducted	Ducted	Attic	8.0	New

WATER HEATING

Qty.	Type	Gallons	Min. Eff	Distribution	Status
1	Heat Pump	50	3.20	Standard	New

2022 Single-Family Residential Mandatory Requirements Summary

NOTE: Single-family residential buildings subject to the Energy Codes must comply with all applicable mandatory measures, regardless of the compliance approach used. Review the respective section for more information.
(04/2022)

Building Envelope:

§ 110.6(a)1:	**Air Leakage.** Manufactured fenestration, exterior doors, and exterior pet doors must limit air leakage to 0.3 CFM per square foot or less when tested per NFRC-400, ASTM E283, or AAMA/WDMA/CSA 101/I.S.2/A440-2011. *
§ 110.6(a)5:	**Labeling.** Fenestration products and exterior doors must have a label meeting the requirements of § 10-111(a).
§ 110.6(b):	**Field fabricated exterior doors and fenestration** products must use U-factors and solar heat gain coefficient (SHGC) values from Tables 110.6-A, 110.6-B, or JA4.5 for exterior doors. They must be caulked and/or weather-stripped. *
§ 110.7:	**Air Leakage.** All joints, penetrations, and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, or weather stripped.
§ 110.8(a):	**Insulation Certification by Manufacturers.** Insulation must be certified by the Department of Consumer Affairs, Bureau of Household Goods and Services (BHGS).
§ 110.8(g):	**Insulation Requirements for Heated Slab Floors.** Heated slab floors must be insulated per the requirements of § 110.8(g).
§ 110.8(i):	**Roofing Products Solar Reflectance and Thermal Emittance.** The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.8(i) and be labeled per §10-113 when the installation of a cool roof is specified on the CF1R.
§ 110.8(j):	**Radiant Barrier.** When required, radiant barriers must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.
§ 150.0(a):	**Roof Deck, Ceiling and Rafter Roof Insulation.** Roof decks in newly constructed attics in climate zones 4 and 8-16 area-weighted average U-factor not exceeding U-0.184. Ceiling and rafter roofs minimum R-22 insulation in wood-frame ceiling; or area-weighted average U-factor must not exceed 0.043. Rafter roof alterations minimum R-19 or area-weighted average U-factor of 0.054 or less. Attic access doors must have permanently attached insulation using adhesive or mechanical fasteners. The attic access must be gasketed to prevent air leakage. Insulation must be installed in direct contact with a roof or ceiling which is sealed to limit infiltration and exfiltration, as specified in § 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling. *
§ 150.0(b):	**Loose-fill Insulation.** Loose fill insulation must meet the manufacturer's required density for the labeled R-value.
§ 150.0(c):	**Wall Insulation.** Minimum R-13 insulation in 2x4 inch wood framing wall or have a U-factor of 0.102 or less, or for R-20 in 2x6 inch wood framing or have a U-factor of 0.071 or less. Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102. Masonry walls must meet Tables 150.1-A or B. *
§ 150.0(d):	**Raised-floor Insulation.** Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor. *
§ 150.0(f):	**Slab Edge Insulation.** Slab edge insulation must meet all of the following: have a water absorption rate, for the insulation material alone without facings, no greater than 0.3 percent; have a water vapor permeance no greater than 2.0 perm per inch; be protected from physical damage and UV light deterioration; and, when installed as part of a heated slab floor, meet the requirements of § 110.8(g).
§ 150.0(g)1:	**Vapor Retarder.** In climate zones 1 through 16, the earth floor of unvented crawl space must be covered with a Class I or Class II vapor retarder. This requirement also applies to controlled ventilation crawl space for buildings complying with the exception to §150.0(d).
§ 150.0(g)2:	**Vapor Retarder.** In climate zones 14 and 16, a Class I or Class II vapor retarder must be installed on the conditioned space side of all insulation in all exterior walls, vented attics, and unvented attics with air-permeable insulation.
§ 150.0(q):	**Fenestration Products.** Fenestration, including skylights, separating conditioned space from unconditioned space or outdoors must have a maximum U-factor of 0.45; or area-weighted average U-factor of all fenestration must not exceed 0.45.

Fireplaces, Decorative Gas Appliances, and Gas Log:

§ 110.5(e)	**Pilot Light.** Continuously burning pilot lights are not allowed for indoor and outdoor fireplaces.
§ 150.0(e)1:	**Closable Doors.** Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.
§ 150.0(e)2:	**Combustion Intake.** Masonry or factory-built fireplaces must have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper or combustion-air control device. *
§ 150.0(e)3:	**Flue Damper.** Masonry or factory-built fireplaces must have a flue damper with a readily accessible control. *

Space Conditioning, Water Heating, and Plumbing System:

§ 110.0-§ 110.3:	**Certification.** Heating, ventilation, and air conditioning (HVAC) equipment, water heaters, showerheads, faucets, and all other regulated appliances must be certified by the manufacturer to the California Energy Commission. *
§ 110.2(a):	**HVAC Efficiency.** Equipment must meet the applicable efficiency requirements in Table 110.2-A through Table 110.2-N. *
§ 110.2(b):	**Controls for Heat Pumps with Supplementary Electric Resistance Heaters.** Heat pumps with supplementary electric resistance heaters must have controls that prevent supplementary heater operation when the heating load can be met by the heat pump alone; and in which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.
§ 110.2(c):	**Thermostats.** All heating or cooling systems not controlled by a central energy management control system (EMCS) must have a setback thermostat. *
§ 110.3(c)3:	**Insulation.** Unfired service water heater storage tanks and solar water-heating backup tanks must have adequate insulation, or tank surface heat loss rating.
§ 110.3(c)6:	**Isolation Valves.** Instantaneous water heaters with an input rating greater than 6.8 kBtu per hour (2 kW) must have isolation valves with hose bibbs or other fittings on both cold and hot water lines to allow for flushing the water heater when the valves are closed.

2022 Single-Family Residential Mandatory Requirements Summary

§ 110.5:	**Pilot Lights.** Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces; household cooking appliances (except appliances without an electrical supply voltage connection with pilot lights that consume less than 150 Btu per hour); and pool and spa heaters. *
§ 150.0(h)1:	**Building Cooling and Heating Loads.** Heating and/or cooling loads are calculated in accordance with the ASHRAE Handbook, Equipment Volume, Applications Volume, and Fundamentals Volume; the SMACNA Residential Comfort System Installation Standards Manual; or the ACCA Manual J using design conditions specified in § 150.0(h)2.
§ 150.0(h)3A:	**Clearances.** Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 150.0(h)3B:	**Liquid Line Drier.** Air conditioners and heat pump systems must be equipped with liquid line filter driers if required, as specified by the manufacturer's instructions.
§ 150.0(j)1:	**Water Piping, Solar Water-heating System Piping, and Space Conditioning System Line Insulation.** All domestic hot water piping must be insulated as specified in § 609.11 of the California Plumbing Code. *
§ 150.0(j)2:	**Insulation Protection.** Piping insulation must be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind as required by §120.3(b). Insulation exposed to weather must be water retardant and protected from UV light (no adhesive tapes). Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space must include, or be protected by, a Class I or Class II vapor retarder. Pipe insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve.
§ 150.0(n)1:	**Gas or Propane Water Heating Systems.** Systems using gas or propane water heaters to serve individual dwelling units must designate a space at least 2.5' x 2.5' x 7' suitable for the future installation of a heat pump water heater, and meet electrical and plumbing requirements, based on the distance between this designated space and the water heater location; and a condensate drain no more than 2" higher than the base of the water heater
§ 150.0(n)3:	**Solar Water-heating Systems.** Solar water-heating systems and collectors must be certified and rated by the Solar Rating and Certification Corporation (SRCC), the International Association of Plumbing and Mechanical Officials, Research and Testing (IAPMO R&T), or by a listing agency that is approved by the executive director.

Ducts and Fans:

§ 110.8(d)3:	**Ducts.** Insulation installed on an existing space-conditioning duct must comply with § 604.0 of the California Mechanical Code (CMC). If a contractor installs the insulation, the contractor must certify to the customer, in writing, that the insulation meets this requirement.
§ 150.0(m)1:	**CMC Compliance.** All air-distribution system ducts and plenums must meet CMC §§ 601.0-605.0 and ANSI/SMACNA-006-2006 HVAC Duct Construction Standards Metal and Flexible 3rd Edition. Portions of supply-air and return-air ducts and plenums must be insulated to R-6.0 or higher; ducts located entirely in conditioned space as confirmed through field verification and diagnostic testing (RA3.1.4.3.8) do not require insulation. Connections of metal ducts and inner core of flexible ducts must be mechanically fastened. Openings must be sealed with mastic, tape, or other duct-closure system that meets the applicable UL requirements, or aerosol sealant that meets UL 723. The combination of mastic and either mesh or tape must be used to seal openings greater than ¼", if mastic or tape is used. Building cavities, air handler support platforms, and plenums designed or constructed with materials other than sealed sheet metal, duct board or flexible duct must not be used to convey conditioned air. Building cavities and support platforms may contain ducts; ducts installed in these spaces must not be compressed. *
§ 150.0(m)2:	**Factory-Fabricated Duct Systems.** Factory-fabricated duct systems must comply with applicable requirements for duct construction, connections, and closures; joints and seams of duct systems and their components must not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.
§ 150.0(m)3:	**Field-Fabricated Duct Systems.** Field-fabricated duct systems must comply with applicable requirements for: pressure-sensitive tapes, mastics, sealants, and other requirements specified for duct construction.
§ 150.0(m)7:	**Backdraft Damper.** Fan systems that exchange air between the conditioned space and outdoors must have backdraft or automatic dampers.
§ 150.0(m)8:	**Gravity Ventilation Dampers.** Gravity ventilating systems serving conditioned space must have either automatic or readily accessible, manually operated dampers in all openings to the outside, except combustion inlet and outlet air openings and elevator shaft vents.
§ 150.0(m)9:	**Protection of Insulation.** Insulation must be protected from damage due tosunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather must be suitable for outdoor service (e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover). Cellular foam insulation must be protected as above or painted with a water retardant and solar radiation-resistant coating.
§ 150.0(m)10:	**Porous Inner Core Flex Duct.** Porous inner cores of flex ducts must have a non-porous layer or air barrier between the inner core and outer vapor barrier.
§ 150.0(m)11:	**Duct System Sealing and Leakage Test.** When space conditioning systems use forced air duct systems to supply conditioned air to an occupiable space, the ducts must be sealed and duct leakage tested, as confirmed through field verification and diagnostic testing, in accordance with Reference Residential Appendix RA3.1.
§ 150.0(m)12:	**Air Filtration.** Space conditioning systems with ducts exceeding 10 feet and the supply side of ventilation systems must have MERV 13 or equivalent filters. Filters for space conditioning systems must have a two inch depth or can be one inch if sized per Equation 150.0-A. Clean-filter pressure drop and labeling must meet the requirements in §150.0(m)12. Filters must be accessible for regular service. Filter racks or grilles must use gaskets, sealing, or other means to close gaps around the inserted filters to and prevents air from bypassing the filter. *

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§ 150.0(m)13:	**Space Conditioning System Airflow Rate and Fan Efficacy.** Space conditioning systems that use ducts to supply cooling must have a hole for the placement of a static pressure probe, or a permanently installed static pressure probe in the supply plenum. Airflow must be ≥ 350 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.45 watts per CFM for gas furnace air handlers and ≤ 0.58 watts per CFM for all others. Small duct high velocity systems must provide an airflow ≥ 250 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.62 watts per CFM. Field verification testing is required in accordance with Reference Residential Appendix RA3.3. *

Ventilation and Indoor Air Quality:

§ 150.0(o)1:	**Requirements for Ventilation and Indoor Air Quality.** All dwelling units must meet the requirements of ASHRAE Standard 62.2, Ventilation and Acceptable Indoor Air Quality in Residential Buildings subject to the amendments specified in § 150.0(o)1. *
§ 150.0(o)1B:	**Central Fan Integrated (CFI) Ventilation Systems.** Continuous operation of CFI air handlers is not allowed to provide the whole-dwelling unit ventilation airflow required per §150.0(o)1C. A motorized damper(s) must be installed on the ventilation duct(s) that prevents all airflow through the space conditioning duct system when the damper(s) is closed andcontrolled per §150.0(o)1Biii&iv. CFI ventilation systems must have controls that track outdoor air ventilation run time, and either open or close the motorized damper(s) for compliance with §150.0(o)1C.
§ 150.0(o)1C:	**Whole-Dwelling Unit Mechanical Ventilation for Single-Family Detached and townhouses .** Single-family detached dwelling units, and attached dwelling units not sharing ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces must have mechanical ventilation airflow specified in § 150.0(o)1Ci-iii.
§ 150.0(o)1G:	**Local Mechanical Exhaust.** Kitchens and bathrooms must have local mechanical exhaust; nonenclosed kitchens must have demand-controlled exhaust system meeting requirements of §150.0(o)1Gii,enclosed kitchens and bathrooms can use demand-controlled or continuous exhaust meeting §150.0(o)1Giii-iv. Airflow must be measured by the installer per §150.0(o)1Gv, and rated for sound per §150.0(o)1Gvi. *
§ 150.0(o)1H&I:	**Airflow Measurement and Sound Ratings of Whole-Dwelling Unit Ventilation Systems.** The airflow required per § 150.0(o)1C must be measured by using a flow hood, flow grid, or other airflow measuring device at the fan's inlet or outlet terminals/grilles per Reference Residential Appendix RA3.7. Whole-Dwelling unit ventilation systems must be rated for sound per ASHRAE 62.2 §7.2 at no less than the minimum airflow rate required by §150.0(o)1C.
§ 150.0(o)2:	**Field Verification and Diagnostic Testing.** Whole-Dwelling Unit ventilation airflow, vented range hood airflow and sound rating, and HRV and ERV fan efficacy must be verified in accordance with Reference Residential Appendix RA3.7. Vented range hoods must be verified per Reference Residential Appendix RA3.7.4.3 to confirm if it is rated by HVI or AHAM to comply with the airflow rates and sound requirements per §150.0(o)1G

Pool and Spa Systems and Equipment:

§ 110.4(a):	**Certification by Manufacturers.** Any pool or spa heating system or equipment must be certified to have all of the following: compliance with the Appliance Efficiency Regulations and listing in MAEDbS; an on-off switch mounted outside of the heater that allows shutting off the heater without adjusting the thermostat setting; a permanent weatherproof plate or card with operating instructions; and must not use electric resistance heating. *
§ 110.4(b)1:	**Piping.** Any pool or spa heating system or equipment must be installed with at least 36 inches of pipe between the filter and the heater, or dedicated suction and return lines, or built-in or built-up connections to allow for future solar heating.
§ 110.4(b)2:	**Covers.** Outdoor pools or spas that have a heat pump or gas heater must have a cover.
§ 110.4(b)3:	**Directional Inlets and Time Switches for Pools.** Pools must have directional inlets that adequately mix the pool water, and a time switch that will allow all pumps to be set or programmed to run only during off-peak electric demand periods.
§ 110.5:	**Pilot Light.** Natural gas pool and spa heaters must not have a continuously burning pilot light.
§ 150.0(p):	**Pool Systems and Equipment Installation.** Residential pool systems or equipment must meet the specified requirements for pump sizing, flow rate, piping, filters, and valves.

Lighting:

§ 110.9:	**Lighting Controls and Components.** All lighting control devices and systems, ballasts, and luminaires must meet the applicable requirements of § 110.9. *
§ 150.0(k)1A:	**Luminaire Efficacy.** All installed luminaires must meet the requirements in Table 150.0-A, except lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, and garage door openers; navigation lighting less than 5 watts; and lighting internal to drawers, cabinets, and linen closets with an efficacy of at least 45 lumens per watt.
§ 150.0(k)1B:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1C:	**Recessed Downlight Luminaires in Ceilings.** Luminaires recessed into ceilings must not contain screw based sockets, must be airtight, and must be sealed with a gasket or caulk. California Electrical Code § 410.116 must also be met.
§ 150.0(k)1D:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1E:	**Blank Electrical Boxes.** The number of electrical boxes that are more than five feet above the finished floor and do not contain a luminaire or other device shall be no more than the number of bedrooms. These boxes must be served by a dimmer, vacancy sensor control, low voltage wiring, or fan speed control.
§ 150.0(k)1F:	**Lighting Integral to Exhaust Fans.** Lighting integral to exhaust fans (except when installed by the manufacturer in kitchen exhaust hoods) must meet the applicable requirements of § 150.0(k). *

2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(k)1G:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1H:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1I:	**Light Sources in Drawers, Cabinets, and Linen Closets.** Light sources internal to drawers, cabinetry or linen closets are not required to comply with Table 150.0-A or be controlled by vacancy sensors provided that they are rated to consume no more than 5 watts of power, emit no more than 150 lumens, and are equipped with controls that automatically turn the lighting off when the drawer, cabinet or linen closet is closed.
§ 150.0(k)2A:	**Interior Switches and Controls.** All forward phase cut dimmers used with LED light sources must comply with NEMA SSL 7A.
§ 150.0(k)2B:	**Interior Switches and Controls.** Exhaust fans must be controlled separately from lighting systems. *
§ 150.0(k)2A:	**Accessible Controls.** Lighting must have readily accessible wall-mounted controls that allow the lighting to be manually turned on and off. *
§ 150.0(k)2B:	**Multiple Controls.** Controls must not bypass a dimmer, occupant sensor, or vacancy sensor function if the dimmer or sensor is installed to comply with § 150.0(k).
§ 150.0(k)2C:	**Mandatory Requirements.** Lighting controls must comply with the applicable requirements of § 110.9.
§ 150.0(k)2D:	**Energy Management Control Systems.** An energy management control system (EMCS) may be used to comply with dimming, occupancy, and control requirements if it provides the functionality of the specified control per § 110.9 and the physical controls specified in § 150.0(k)2A.
§ 150.0(k)2E:	**Automatic Shutoff Controls.** In bathrooms, garages, laundry rooms, utility rooms and walk-in closets, at least one installed luminaire must be controlled by an occupancy or vacancy sensor providing automatic-off functionality. Lighting inside drawers and cabinets with opaque fronts or doors must have controls that turn the light off when the drawer or door is closed.
§ 150.0(k)2F:	**Dimmers.** Lighting in habitable spaces (e.g., living rooms, dining rooms, kitchens, and bedrooms) must have readily accessible wall-mounted dimming controls that allow the lighting to be manually adjusted up and down. Forward phase cut dimmers controlling LED light sources in these spaces must comply with NEMA SSL 7A.
§ 150.0(k)2K:	**Independent controls.** Integrated lighting of exhaust fans shall be controlled independently from the fans. Lighting under cabinets or shelves, lighting in display cabinets, and switched outlets must be controlled separately from ceiling-installed lighting.
§ 150.0(k)3A:	**Residential Outdoor Lighting.** For single-family residential buildings, outdoor lighting permanently mounted to a residential building, or to other buildings on the same lot, must have a manual on/off switch and either a photocell and motion sensor or automatic time switch control) or an astronomical time clock. An energy management control system that provides the specified control functionality and meets all applicable requirements may be used to meet these requirements.
§ 150.0(k)4:	**Internally illuminated address signs.** Internally illuminated address signs must either comply with § 140.8 or consume no more than 5 watts of power.
§ 150.0(k)5:	**Residential Garages for Eight or More Vehicles.** Lighting for residential parking garages for eight or more vehicles must comply with the applicable requirements for nonresidential garages in §§ 110.9, 130.0, 130.1, 130.4, 140.6, and 141.0.

Solar Readiness:

§ 110.10(a)1:	**Single-family Residences.** Single-family residences located in subdivisions with 10 or more single-family residences and where the application for a tentative subdivision map for the residences has been deemed complete and approved by the enforcement agency, which do not have a photovoltaic system installed, must comply with the requirements of § 110.10(b)-(e).
§110.10(b)1A:	**Minimum Solar Zone Area.** The solar zone must have a minimum total area as described below. The solar zone must comply with access, pathway, smoke ventilation, and spacing requirements as specified in Title 24, Part 9 or other parts of Title 24 or in any requirements adopted by a local jurisdiction. The solar zone total area must be comprised of areas that have no dimension less than 5 feet and are no less than 80 square feet each for buildings with roof areas less than or equal to 10,000 square feet or no less than 160 square feet each for buildings with roof areas greater than 10,000 square feet. For single-family residences, the solar zone must be located on the roof or overhang of the building and have a total area no less than 250 square feet. *
§ 110.10(b)2:	**Azimuth.** All sections of the solar zone located on steep-sloped roofs must have an azimuth between 90-300° of true north.
§ 110.10(b)3A:	**Shading.** The solar zone must not contain any obstructions, including but not limited to: vents, chimneys, architectural features, and roof mounted equipment.
§ 110.10(b)3B:	**Shading.** Any obstruction located on the roof or any other part of the building that projects above a solar zone must be located at least twice the horizontal distance of the height difference between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone, measured in the vertical plane. *
§ 110.10(b)4:	**Structural Design Loads on Construction Documents.** For areas of the roof designated as a solar zone, the structural design loads for roof dead load and roof live load must be clearly indicated on the construction documents.
§ 110.10(c):	**Interconnection Pathways.** The construction documents must indicate: a location reserved for inverters and metering equipment and a pathway reserved for routing of conduit from the solar zone to the point of interconnection with the electrical service; and for single-family residences and central water-heating systems, a pathway reserved for routing plumbing from the solar zone to the water-heating system.
§ 110.10(d):	**Documentation.** A copy of the construction documents or a comparable document indicating the information from § 110.10(b)-(c) must be provided to the occupant.
§ 110.10(e)1:	**Main Electrical Service Panel.** The main electrical service panel must have a minimum busbar rating of 200 amps.
§ 110.10(e)2:	**Main Electrical Service Panel.** The main electrical service panel must have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space must be permanently marked as "For Future Solar Electric."

Electric and Energy Storage Ready:

2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(s)	**Energy Storage System (ESS) Ready.** All single-family residences must meet all of the following: Either ESS-ready interconnection equipment with backed up capacity of 60 amps or more and four or more ESS supplied branch circuits, or a dedicated raceway from the main service to a subpanel that supplies the branch circuits in § 150.0(s); at least four branch circuits must be identified and have their source collocated at a single panelboard suitable to be supplied by the ESS, with one circuit supplying the refrigerator, one lighting circuit near the primary exit, and one circuit supplying a sleeping room receptacle outlet; main panelboard must have a minimum busbar rating of 225 amps; sufficient space must be reserved to allow future installation of a system isolation equipment/transfer switch within 3' of the main panelboard, with raceways installed between the panelboard and the switch location to allow the connection of backup power source.
§ 150.0(t)	**Heat Pump Space Heater Ready.** Systems using gas or propane furnaces to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the furnace with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use." *
§ 150.0(u)	**Electric Cooktop Ready.** Systems using gas or propane cooktop to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the cooktop with circuit conductors rated at least 50 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."
§ 150.0(v)	**Electric Clothes Dryer Ready.** Clothes dryer locations with gas or propane plumbing to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the dryer location with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."

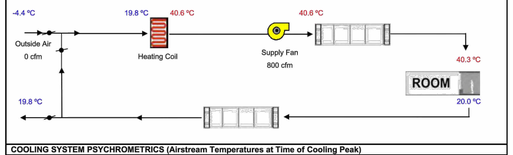
*Exceptions may apply.

HVAC SYSTEM HEATING AND COOLING LOADS SUMMARY

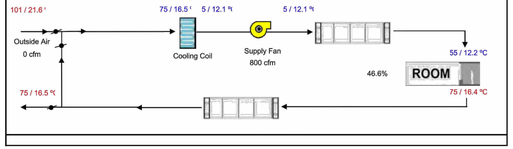
Project Name	Date
Option # 1 Duplex Unit 2	24-06-2023
System Name	Floor Area
HVAC System	996

ENGINEERING CHECKS		SYSTEM LOAD	COIL COOLING PEAK CFM	Sensible	Latent	COIL HTG. PEAK CFM	Sensible
Number of Systems	1						
Heating System							
Output per System	30,000	Total Room Loads	422	8,793	494	243	9,490
Total Output (Btuh)	30,000	Return Vented Lighting		0			0
Output (Btuh/sqft)	30.1	Return Air Ducts		405			371
Cooling System		Return Fan		0			0
Output per System	27,000	Ventilation	0	0	0	0	0
Total Output (Btuh)	27,000	Supply Fan		0			0
Total Output (Tons)	2.3	Supply Air Ducts		405			371
Total Output (Btuh/sqft)	27.1						
Total Output (sqft/Ton)	442.7	TOTAL SYSTEM LOAD		9,604	494		10,231
Air System							
CFM per System	800	HVAC EQUIPMENT SELECTION					
Airflow (cfm)	800	LH248HV4		23,096	974		17,721
Airflow (cfm/sqft)	0.80						
Airflow (cfm/Ton)	355.6						
Outside Air (%)	0.0%	Total Adjusted System Output (Adjusted for Peak Design conditions)		23,096	974		17,721
Outside Air (cfm/sqft)	0.00						
Note: values above given at ARI conditions		TIME OF SYSTEM PEAK		Aug 3 PM			Jan 1 AM

HEATING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Heating Peak)



COOLING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Cooling Peak)



DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT — ROBIN R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JUNE 29, 2023

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF THE ARCHITECT AND SHALL NOT BE USED ON ANY OTHER PROJECT OR LOCATIONS EXCEPT AS DESCRIBED ON THE DRAWINGS WITHOUT WRITTEN AGREEMENT WITH THE ARCHITECT.

TITLE

TITLE 24 ENERGY COMPLIANCE

SCALE

T24-2.2

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

©

6/30/2023 2:52:13 PM
24" X 36"

RESIDENTIAL MEASURES SUMMARY — RMS-1

Project Name	Building Type			Date
Option # 1 Duplex Unit 2	☑ Single Family ☐ Multi Family	☐ Addition Alone ☐ Existing+ Addition/Alteration		24-06-2023
Project Address	**California Energy Climate Zone**	**Total Cond. Floor Area**	**Addition**	**# of Units**
Option # 1 Duplex Unit 2 Fresno County	CA Climate Zone 13	996	n/a	1

INSULATION

Construction Type		Cavity	Area (ft²)	Special Features	Status
Wall	Wood Framed	R 20	474		New
Demising	Wood Framed	R 13	136		New
Demising	Wood Framed	- no insulation	288		New
Slab	Unheated Slab-on-Grade	- no insulation	996	Perim = 79'	New
Roof	Wood Framed Attic	R 38	996	Add=R-13.0	New

FENESTRATION

Total Area: 159 | Glazing Percentage: 16.0% | New/Altered Average U-Factor: 0.30

Orientation	Area(ft²)	U-Fac	SHGC	Overhang	Sidefins	Exterior Shades	Status
Front (W)	20.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	3.7	none	N/A	New
Rear (E)	10.0	0.300	0.23	none	none	N/A	New
Rear (E)	34.5	0.300	0.23	none	none	N/A	New
Right (S)	34.5	0.300	0.23	13.6	none	N/A	New

HVAC SYSTEMS

Qty.	Heating	Min. Eff	Cooling	Min. Eff	Thermostat	Status
1	Electric Heat Pump	9.00 HSPF	Split Heat Pump	16.9 SEER	Setback	New

HVAC DISTRIBUTION

Location	Heating	Cooling	Duct Location	Duct R-Value	Status
HVAC System	Ducted	Ducted	Attic	8.0	New

WATER HEATING

Qty.	Type	Gallons	Min. Eff	Distribution	Status
1	Heat Pump	50	3.20	Standard	New

2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(k)1G:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1H:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1I:	**Light Sources in Drawers, Cabinets, and Linen Closets.** Light sources internal to drawers, cabinetry or linen closets are not required to comply with Table 150.0-A or be controlled by vacancy sensors provided that they are rated to consume no more than 5 watts of power, emit no more than 150 lumens, and are equipped with controls that automatically turn the lighting off when the drawer, cabinet or linen closet is closed.
§ 150.0(k)2A:	**Interior Switches and Controls.** All forward phase cut dimmers used with LED light sources must comply with NEMA SSL 7A.
§ 150.0(k)2B:	**Interior Switches and Controls.** Exhaust fans must be controlled separately from lighting systems. *
§ 150.0(k)2A:	**Accessible Controls.** Lighting must have readily accessible wall-mounted controls that allow the lighting to be manually turned on and off. *
§ 150.0(k)2B:	**Multiple Controls.** Controls must not bypass a dimmer, occupant sensor, or vacancy sensor function if the dimmer or sensor is installed to comply with § 150.0(k).
§ 150.0(k)2C:	**Mandatory Requirements.** Lighting controls must comply with the applicable requirements of § 110.9.
§ 150.0(k)2D:	**Energy Management Control Systems.** An energy management control system (EMCS) may be used to comply with dimming, occupancy, and control requirements if it provides the functionality of the specified control per § 110.9 and the physical controls specified in § 150.0(k)2A.
§ 150.0(k)2E:	**Automatic Shutoff Controls.** In bathrooms, garages, laundry rooms, utility rooms and walk-in closets, at least one installed luminaire must be controlled by an occupancy or vacancy sensor providing automatic-off functionality. Lighting inside drawers and cabinets with opaque fronts or doors must have controls that turn the light off when the drawer or door is closed.
§ 150.0(k)2F:	**Dimmers.** Lighting in habitable spaces (e.g., living rooms, dining rooms, kitchens, and bedrooms) must have readily accessible wall-mounted dimming controls that allow the lighting to be manually adjusted up and down. Forward phase cut dimmers controlling LED light sources in these spaces must comply with NEMA SSL 7A.
§ 150.0(k)2K:	**Independent controls.** Integrated lighting of exhaust fans shall be controlled independently from the fans. Lighting under cabinets or shelves, lighting in display cabinets, and switched outlets must be controlled separately from ceiling-installed lighting.
§ 150.0(k)3A:	**Residential Outdoor Lighting.** For single-family residential buildings, outdoor lighting permanently mounted to a residential building, or to other buildings on the same lot, must have a manual on/off switch and either a photocell and motion sensor or automatic time switch control) or an astronomical time clock. An energy management control system that provides the specified control functionality and meets all applicable requirements may be used to meet these requirements.
§ 150.0(k)4:	**Internally illuminated address signs.** Internally illuminated address signs must either comply with § 140.8 or consume no more than 5 watts of power.
§ 150.0(k)5:	**Residential Garages for Eight or More Vehicles.** Lighting for residential parking garages for eight or more vehicles must comply with the applicable requirements for nonresidential garages in §§ 110.9, 130.0, 130.1, 130.4, 140.6, and 141.0.

Solar Readiness:

§ 110.10(a)1:	**Single-family Residences.** Single-family residences located in subdivisions with 10 or more single-family residences and where the application for a tentative subdivision map for the residences has been deemed complete and approved by the enforcement agency, which do not have a photovoltaic system installed, must comply with the requirements of § 110.10(b)-(e).
§110.10(b)1A:	**Minimum Solar Zone Area.** The solar zone must have a minimum total area as described below. The solar zone must comply with access, pathway, smoke ventilation, and spacing requirements as specified in Title 24, Part 9 or other parts of Title 24 or in any requirements adopted by a local jurisdiction. The solar zone total area must be comprised of areas that have no dimension less than 5 feet and are no less than 80 square feet each for buildings with roof areas less than or equal to 10,000 square feet or no less than 160 square feet each for buildings with roof areas greater than 10,000 square feet. For single-family residences, the solar zone must be located on the roof or overhang of the building and have a total area no less than 250 square feet. *
§ 110.10(b)2:	**Azimuth.** All sections of the solar zone located on steep-sloped roofs must have an azimuth between 90-300° of true north.
§ 110.10(b)3A:	**Shading.** The solar zone must not contain any obstructions, including but not limited to: vents, chimneys, architectural features, and roof mounted equipment. *
§ 110.10(b)3B:	**Shading.** Any obstruction located on the roof or any other part of the building that projects above a solar zone must be located at least twice the horizontal distance of the height difference between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone, measured in the vertical plane. '
§ 110.10(b)4:	**Structural Design Loads on Construction Documents.** For areas of the roof designated as a solar zone, the structural design loads for roof dead load and roof live load must be clearly indicated on the construction documents.
§ 110.10(c):	**Interconnection Pathways.** The construction documents must indicate: a location reserved for inverters and metering equipment and a pathway reserved for routing of conduit from the solar zone to the point of interconnection with the electrical service; and for single-family residences and central water-heating systems, a pathway reserved for routing plumbing from the solar zone to the water-heating system.
§ 110.10(d):	**Documentation.** A copy of the construction documents or a comparable document indicating the information from § 110.10(b)-(c) must be provided to the occupant.
§ 110.10(e)1:	**Main Electrical Service Panel.** The main electrical service panel must have a minimum busbar rating of 200 amps.
§ 110.10(e)2:	**Main Electrical Service Panel.** The main electrical service panel must have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space must be permanently marked as "For Future Solar Electric."

Electric and Energy Storage Ready:

5/6/22

2022 Single-Family Residential Mandatory Requirements Summary

NOTE: Single-family residential buildings subject to the Energy Codes must comply with all applicable mandatory measures, regardless of the compliance approach used. Review the respective section for more information. (04/2022)

Building Envelope:

§ 110.6(a)1:	**Air Leakage.** Manufactured fenestration, exterior doors, and exterior pet doors must limit air leakage to 0.3 CFM per square foot or less when tested per NFRC-400, ASTM E283, or AAMA/WDMA/CSA 101/I.S.2/A440-2011. *
§ 110.6(a)5:	**Clearances.** Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 110.6(b):	**Field fabricated exterior doors and fenestration** products must use U-factors and solar heat gain coefficient (SHGC) values from Tables 110.6-A, 110.6-B, or JA4.5 for exterior doors. They must be caulked and/or weather-stripped. *
§ 110.7:	**Air Leakage.** All joints, penetrations, and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, or weather stripped.
§ 110.8(a):	**Insulation Certification by Manufacturers.** Insulation must be certified by the Department of Consumer Affairs, Bureau of Household Goods and Services (BHGS).
§ 110.8(g):	**Insulation Requirements for Heated Slab Floors.** Heated slab floors must be insulated per the requirements of § 110.8(g).
§ 110.8(i):	**Roofing Products Solar Reflectance and Thermal Emittance.** The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.8(i) and be labeled per §10-113 when the installation of a cool roof is specified on the CF1R.
§ 110.8(j):	**Radiant Barrier.** When required, radiant barriers must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.
§ 150.0(a):	**Roof Deck, Ceiling and Rafter Roof Insulation.** Roof decks in newly constructed attics in climate zones 4 and 8-16 area-weighted average U-factor not exceeding U-0.184. Ceiling and rafter roofs minimum R-22 insulation in wood-frame ceiling; or area-weighted average U-factor must not exceed 0.043. Rafter roof alterations minimum R-19 or area-weighted average U-factor of 0.054 or less. Attic access doors must have permanently attached insulation using adhesive or mechanical fasteners. The attic access must be gasketed to prevent air leakage. Insulation must be installed in direct contact with a roof or ceiling which is sealed to limit infiltration and exfiltration, as specified in § 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling. *
§ 150.0(b):	**Loose-fill Insulation.** Loose fill insulation must meet the manufacturer's required density for the labeled R-value.
§ 150.0(c):	**Wall Insulation.** Minimum R-13 insulation in 2x4 inch wood framing wall or have a U-factor of 0.102 or less, or R-20 in 2x6 inch wood framing or have a U-factor of 0.071 or less. Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102. Masonry walls must meet Tables 150.1-A or B. *
§ 150.0(d):	**Raised-floor Insulation.** Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor. *
§ 150.0(f):	**Slab Edge Insulation.** Slab edge insulation must meet all of the following: have a water absorption rate, for the insulation material alone without facings, no greater than 0.3 percent; have a water vapor permeance no greater than 2.0 perm per inch; be protected from physical damage and UV light deterioration; and, when installed as part of a heated slab floor, meet the requirements of § 110.8(g).
§ 150.0(g)1:	**Vapor Retarder.** In climate zones 1 through 16, the earth floor of unvented crawl space must be covered with a Class I or Class II vapor retarder. This requirement also applies to controlled ventilation crawl space for buildings complying with the exception to §150.0(d).
§ 150.0(g)2:	**Vapor Retarder.** In climate zones 14 and 16, a Class I or Class II vapor retarder must be installed on the conditioned space side of all insulation in all exterior walls, vented attics, and unvented attics with air-permeable insulation.
§ 150.0(q):	**Fenestration Products.** Fenestration, including skylights, separating conditioned space from unconditioned space or outdoors must have a maximum U-factor of 0.45; or area-weighted average U-factor of all fenestration must not exceed 0.45. *

Fireplaces, Decorative Gas Appliances, and Gas Log:

§ 110.5(e)	**Pilot Light.** Continuously burning pilot lights are not allowed for indoor and outdoor fireplaces.
§ 150.0(e)1:	**Closable Doors.** Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.
§ 150.0(e)2:	**Combustion Intake.** Masonry or factory-built fireplaces must have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper or combustion-air control device. *
§ 150.0(e)3:	**Flue Damper.** Masonry or factory-built fireplaces must have a flue damper with a readily accessible control. *

Space Conditioning, Water Heating, and Plumbing System:

§ 110.0-§ 110.3:	**Certification.** Heating, ventilation, and air conditioning (HVAC) equipment, water heaters, showerheads, faucets, and all other regulated appliances must be certified by the manufacturer to the California Energy Commission.
§ 110.2(a):	**HVAC Efficiency.** Equipment must meet the applicable efficiency requirements in Table 110.2-A through Table 110.2-N. *
§ 110.2(b):	**Controls for Heat Pumps with Supplementary Electric Resistance Heaters.** Heat pumps with supplementary electric resistance heaters must have controls that prevent supplementary heater operation when the heating load can be met by the heat pump alone; and in which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.
§ 110.2(c):	**Thermostats.** All heating or cooling systems not controlled by a central energy management control system (EMCS) must have a setback thermostat. *
§ 110.3(c)3:	**Insulation.** Unfired service water heater storage tanks and solar water-heating backup tanks must have adequate insulation, or tank surface heat loss rating.
§ 110.3(c)6:	**Isolation Valves.** Instantaneous water heaters with an input rating greater than 6.8 kBtu per hour (2 kW) must have isolation valves with hose bibs or other fittings on both cold and hot water lines to allow for flushing the water heater when the valves are closed.

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2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(s)	**Energy Storage System (ESS) Ready.** All single-family residences must meet all of the following: Either ESS-ready interconnection equipment with backed up capacity of 60 amps or more and four or more ESS supplied branch circuits, or a dedicated raceway from the main service to a subpanel that supplies the branch circuits in § 150.0(s); at least four branch circuits must be identified and have their source collocated at a single panelboard suitable to be supplied by the ESS, with one circuit supplying the refrigerator, one lighting circuit near the primary exit, and one circuit supplying a sleeping room receptacle outlet; main panelboard must have a minimum busbar rating of 225 amps; sufficient space must be reserved to allow future installation of a system isolation equipment/transfer switch within 3' of the main panelboard, with raceways installed between the panelboard and the switch location to allow the connection of backup power source.
§ 150.0(t)	**Heat Pump Space Heater Ready.** Systems using gas or propane furnaces to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the furnace with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."
§ 150.0(u)	**Electric Cooktop Ready.** Systems using gas or propane cooktop to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the cooktop with circuit conductors rated at least 50 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."
§ 150.0(v)	**Electric Clothes Dryer Ready.** Clothes dryer locations with gas or propane plumbing to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the dryer location with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."

*Exceptions may apply.

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2022 Single-Family Residential Mandatory Requirements Summary

§ 110.5:	**Pilot Lights.** Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces; household cooking appliances (except appliances without an electrical supply voltage connection with pilot lights that consume less than 150 Btu per hour); and pool and spa heaters. *
§ 150.0(h)1:	**Building Cooling and Heating Loads.** Heating and/or cooling loads are calculated in accordance with the ASHRAE Handbook, Equipment Volume, Applications Volume, and Fundamentals Volume; the SMACNA Residential Comfort System Installation Standards Manual; or the ACCA Manual J using design conditions specified in § 150.0(h)2.
§ 150.0(h)3A:	**Clearances.** Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 150.0(h)3B:	**Liquid Line Drier.** Air conditioners and heat pump systems must be equipped with liquid line filter driers if required, as specified by the manufacturer's instructions.
§ 150.0(j)1:	**Water Piping, Solar Water-heating System Piping, and Space Conditioning System Line Insulation.** All domestic hot water piping must be insulated as specified in § 609.11 of the California Plumbing Code. *
§ 150.0(j)2:	**Insulation Protection.** Piping insulation must be protected from damage, including that due to sunlight, moisture, equipment' maintenance, and wind as required by §120.3(b). Insulation exposed to weather must be water retardant and protected from UV light (no adhesive tapes). Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space must include, or be protected by, a Class I or Class II vapor retarder. Pipe insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve.
§ 150.0(n)1:	**Gas or Propane Water Heating Systems.** Systems using gas or propane water heaters to serve individual dwelling units must designate a space at least 2.5' x 2.5' x 7' suitable for the future installation of a heat pump water heater, and meet electrical and plumbing requirements, based on the distance between this designated space and the water heater location; and a condensate drain no more than 2' higher than the base of the water heater.
§ 150.0(n)3:	**Solar Water-heating Systems.** Solar water-heating systems and collectors must be certified and rated by the Solar Rating and Certification Corporation (SRCC), the International Association of Plumbing and Mechanical Officials, Research and Testing (IAPMO R&T), or by a listing agency that is approved by the executive director.

Ducts and Fans:

§ 110.8(d)3:	**Ducts.** Insulation installed on an existing space-conditioning duct must comply with § 604.0 of the California Mechanical Code (CMC). If a contractor installs the insulation, the contractor must certify to the customer, in writing, that the insulation meets this requirement.
§ 150.0(m)1:	**CMC Compliance.** All air-distribution system ducts and plenums must meet CMC §§ 601.0-605.0 and ANSI/SMACNA-006-2006 HVAC Duct Construction Standards Metal and Flexible 3rd Edition. Portions of supply-air and return-air ducts and plenums must be insulated to R-6.0 or higher; ducts located entirely in conditioned space as confirmed through field verification and diagnostic testing (RA3.1.4.3.8) do not require insulation. Connections of metal ducts and inner core of flexible ducts must be mechanically fastened. Openings must be sealed with mastic, tape, or other duct-closure system that meets the applicable UL requirements, or aerosol sealant that meets UL 723. The combination of mastic and either mesh or tape must be used to seal openings greater than ¼". If mastic or tape is used. Building cavities, air handler support platforms, and plenums designed or constructed with materials other than sealed sheet metal, duct board or flexible duct must not be used to convey conditioned air. Building cavities and support platforms may contain ducts; ducts installed in these spaces must not be compressed.
§ 150.0(m)2:	**Factory-Fabricated Duct Systems.** Factory-fabricated duct systems must comply with applicable requirements for duct construction, connections, and closures; joints and seams of duct systems and their components must not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.
§ 150.0(m)3:	**Field-Fabricated Duct Systems.** Field-fabricated duct systems must comply with applicable requirements for: pressure-sensitive tapes, mastics, sealants, and other requirements specified for duct construction.
§ 150.0(m)7:	**Backdraft Damper.** Fan systems that exchange air between the conditioned space and outdoors must have backdraft or automatic dampers.
§ 150.0(m)8:	**Gravity Ventilation Dampers.** Gravity ventilating systems serving conditioned space must have either automatic or readily accessible, manually operated dampers in all openings to the outside, except combustion inlet and outlet air openings and elevator shaft vents.
§ 150.0(m)9:	**Protection of Insulation.** Insulation must be protected from damage due tosunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather must be suitable for outdoor service (e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover). Cellular foam insulation must be protected as above or painted with a water retardant and solar radiation-resistant coating.
§ 150.0(m)10:	**Porous Inner Core Flex Duct.** Porous inner cores of flex ducts must have a non-porous layer or air barrier between the inner core and outer vapor barrier.
§ 150.0(m)11:	**Duct System Sealing and Leakage Test.** When space conditioning systems use forced air duct systems to supply conditioned air to an occupiable space, the ducts must be sealed and duct leakage tested, as confirmed through field verification and diagnostic testing, in accordance with Reference Residential Appendix RA3.1.
§ 150.0(m)12:	**Air Filtration.** Space conditioning systems with ducts exceeding 10 feet and the supply side of ventilation systems must have MERV 13 or equivalent filters. Filters for space conditioning systems must have a two inch depth or can be one inch if sized per Equation 150.0-A. Clean-filter pressure drop and labeling must meet the requirements in §150.0(m)12. Filters must be accessible for regular service. Filter racks or grilles must use gaskets, sealing, or other means to close gaps around the inserted filters to and prevents air from bypassing the filter. *

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2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(m)13:	**Space Conditioning System Airflow Rate and Fan Efficacy.** Space conditioning systems that use ducts to supply cooling must have a hole for the placement of a static pressure probe, or a permanently installed static pressure probe in the supply plenum. Airflow must be ≥ 350 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.45 watts per CFM for gas furnace air handlers and ≤ 0.58 watts per CFM for all others. Small duct high velocity systems must provide an airflow ≥ 250 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.62 watts per CFM. Field verification testing is required in accordance with Reference Residential Appendix RA3.3. *

Ventilation and Indoor Air Quality:

§ 150.0(o)1:	**Requirements for Ventilation and Indoor Air Quality.** All dwelling units must meet the requirements of ASHRAE Standard 62.2, Ventilation and Acceptable Indoor Air Quality in Residential Buildings subject to the amendments specified in § 150.0(o)1. *
§ 150.0(o)1B:	**Central Fan Integrated (CFI) Ventilation Systems.** Continuous operation of CFI air handlers is not allowed to provide the whole-dwelling unit ventilation airflow required per §150.0(o)1C. A motorized damper(s) must be installed on the ventilation duct(s) that prevents all airflow through the space conditioning duct system when the damper(s) is closed andcontrolled per §150.0(o)1Bii&Iv. CFI ventilation systems must have controls that track outdoor air ventilation run time, and either open or close the motorized damper(s) for compliance with §150.0(o)1C.
§ 150.0(o)1C:	**Whole-Dwelling Unit Mechanical Ventilation for Single-Family Detached and townhouses .** Single-family detached dwelling units, and attached dwelling units not sharing ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces must have mechanical ventilation airflow specified in § 150.0(o)1CI-iii.
§ 150.0(o)1G:	**Local Mechanical Exhaust.** Kitchens and bathrooms must have local mechanical exhaust; nonenclosed kitchens must have demand-controlled exhaust system meeting requirements of §150.0(o)1GiiLenclosed kitchens and bathrooms can use demand-controlled or continuous exhaust meeting §150.0(o)1GiiI-Iv. Airflow must be measured by the installer per §150.0(o)1Gv, and rated for sound per §150.0(o)1Gvi. *
§ 150.0(o)1H&I:	**Airflow Measurement and Sound Ratings of Whole-Dwelling Unit Ventilation Systems.** The airflow required per § 150.0(o)1C must be measured by using a flow hood, flow grid, or other airflow measuring device at the fan's inlet or outlet terminals/grilles per Reference Residential Appendix RA3.7. Whole-Dwelling unit ventilation systems must be rated for sound per ASHRAE 62.2 §7.2 at no less than the minimum airflow rate required by §150.0(o)1C.
§ 150.0(o)2:	**Field Verification and Diagnostic Testing.** Whole-Dwelling Unit ventilation airflow, vented range hood airflow and sound rating, and HRV and ERV fan efficacy must be verified in accordance with Reference Residential Appendix RA3.7. Vented range hoods must be verified per Reference Residential Appendix RA3.7.4.3 to confirm if it is rated by HVI or AHAM to comply with the airflow rates and sound requirements per §150.0(o)1G

Pool and Spa Systems and Equipment:

§ 110.4(a):	**Certification by Manufacturers.** Any pool or spa heating system or equipment must be certified to have all of the following: compliance with the Appliance Efficiency Regulations and listing in MAEDbS; an on-off switch mounted outside of the heater that allows shutting off the heater without adjusting the thermostat setting; a permanent weatherproof plate or card with operating instructions; and must not use electric resistance heating. *
§ 110.4(b)1:	**Piping.** Any pool or spa heating system or equipment must be installed with at least 36 inches of pipe between the filter and the heater, or dedicated suction and return lines, or built-in or built-up connections to allow for future solar heating.
§ 110.4(b)2:	**Covers.** Outdoor pools or spas that have a heat pump or gas heater must have a cover.
§ 110.4(b)3:	**Directional Inlets and Time Switches for Pools.** Pools must have directional inlets that adequately mix the pool water, and a time switch that will allow all pumps to be set or programmed to run only during off-peak electric demand periods.
§ 110.5:	**Pilot Light.** Natural gas pool and spa heaters must not have a continuously burning pilot light.
§ 150.0(p):	**Pool Systems and Equipment Installation.** Residential pool systems or equipment must meet the specified requirements for pump sizing, flow rate, piping, filters, and valves. *

Lighting:

§ 110.9:	**Lighting Controls and Components.** All lighting control devices and systems, ballasts, and luminaires must meet the applicable requirements of § 110.9. *
§ 150.0(k)1A:	**Luminaire Efficacy.** All installed luminaires must meet the requirements in Table 150.0-A, except lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, and garage door openers; navigation lighting less than 5 watts; and lighting internal to drawers, cabinets, and linen closets with an efficacy of at least 45 lumens per watt.
§ 150.0(k)1B:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1C:	**Recessed Downlight Luminaires in Ceilings.** Luminaires recessed into ceilings must not contain screw based sockets, must be airtight, and must be sealed with a gasket or caulk. California Electrical Code § 410.116 must also be met.
§ 150.0(k)1D:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1E:	**Blank Electrical Boxes.** The number of electrical boxes that are more than five feet above the finished floor and do not contain a luminaire or other device shall be no more than the number of bedrooms. These boxes must be served by a dimmer, vacancy sensor control, low voltage wiring, or fan speed control.
§ 150.0(k)1F:	**Lighting Integral to Exhaust Fans.** Lighting integral to exhaust fans (except when installed by the manufacturer in kitchen exhaust hoods) must meet the applicable requirements of § 150.0(k). *

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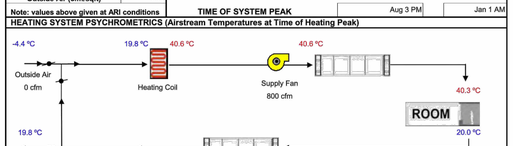
HVAC SYSTEM HEATING AND COOLING LOADS SUMMARY

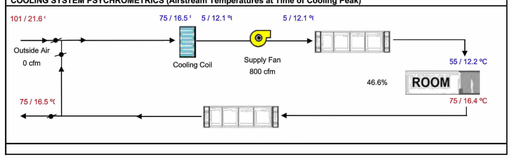
Project Name			Date
Option # 1 Duplex Unit 2			24-06-2023
System Name			Floor Area
HVAC System			996

ENGINEERING CHECKS		SYSTEM LOAD	COIL COOLING PEAK			COIL HTG. PEAK	
Number of Systems	1		CFM	Sensible	Latent	CFM	Sensible
Heating System		Total Room Loads	422	8,793	494	243	9,490
Output per System	30,000	Total Output (Btuh)	30,000	Return Vented Lighting		0	
Output (Btuh/sqft)	30.1	Return Air Ducts		405			371
Cooling System		Return Fan		0			0
Output per System	27,000	Ventilation	0	0	0	0	0
Total Output (Btuh)	27,000	Supply Fan		0			0
Total Output (Tons)	2.3	Supply Air Ducts		405			371
Total Output (Btuh/sqft)	27.1						
Total Output (sqft/Ton)	442.7	TOTAL SYSTEM LOAD		9,604	494		10,231
Air System							
CFM per System	800	HVAC EQUIPMENT SELECTION					
Airflow (cfm)	800	LH248HV4		23,096	974		17,721
Airflow (cfm/sqft)	0.80						
Airflow (cfm/Ton)	355.6						
Outside Air (%)	0.0%	Total Adjusted System Output (Adjusted for Peak Design conditions)		23,096	974		17,721
Outside Air (cfm/sqft)	0.00						
Note: values above given at ARI conditions		TIME OF SYSTEM PEAK		Aug 3 PM			Jan 1 AM

HEATING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Heating Peak)



COOLING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Cooling Peak)



DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT ROBINA R. WRIGHT NO. C-32283 RENEWAL DATE 06/30/2025 STATE OF CALIFORNIA

UPDATE

JUNE 29, 2023

THESE DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY AND COPYRIGHT OF THE ARCHITECT AND SHALL NOT BE USED ON ANY OTHER PROJECT OR LOCATIONS EXCEPT AS DESCRIBED ON THE DRAWINGS WITHOUT WRITTEN AGREEMENT WITH THE ARCHITECT.

TITLE

TITLE 24 MANDATORY REQUIREMENTS

SCALE

MM-1.1

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

©

6/30/2023 2:52:16 PM
24" X 36"

RESIDENTIAL MEASURES SUMMARY — RMS-1

Project Name	Building Type			Date
Option # 1 Duplex Unit 2	☑ Single Family ☐ Multi Family	☐ Addition Alone ☐ Existing+ Addition/Alteration		24-06-2023
Project Address	**California Energy Climate Zone**	**Total Cond. Floor Area**	**Addition**	**# of Units**
Option # 1 Duplex Unit 2 Fresno County	CA Climate Zone 13	996	n/a	1

INSULATION

Construction	Type	Cavity	Area (ft²)	Special Features	Status
Wall	Wood Framed	R 20	474		New
Demising	Wood Framed	R 13	136		New
Demising	Wood Framed	- no insulation	288		New
Slab	Unheated Slab-on-Grade	- no insulation	996	Perim = 79'	New
Roof	Wood Framed Attic	R 38	996	Add=R-13.0	New

FENESTRATION

Total Area: 159 | Glazing Percentage: 16.0% | New/Altered Average U-Factor: 0.30

Orientation	Area(ft²)	U-Fac	SHGC	Overhang	Sidefins	Exterior Shades	Status
Front (W)	20.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	9.7	none	N/A	New
Front (W)	30.0	0.300	0.23	3.7	none	N/A	New
Rear (E)	10.0	0.300	0.23	none	none	N/A	New
Rear (E)	34.5	0.300	0.23	none	none	N/A	New
Right (S)	34.5	0.300	0.23	13.6	none	N/A	New

HVAC SYSTEMS

Qty.	Heating	Min. Eff	Cooling	Min. Eff	Thermostat	Status
1	Electric Heat Pump	9.00 HSPF	Split Heat Pump	16.9 SEER	Setback	New

HVAC DISTRIBUTION

Location	Heating	Cooling	Duct Location	Duct R-Value	Status
HVAC System	Ducted	Ducted	Attic	8.0	New

WATER HEATING

Qty.	Type	Gallons	Min. Eff	Distribution	Status
1	Heat Pump	50	3.20	Standard	New

2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(k)1G:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1H:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1I:	**Light Sources in Drawers, Cabinets, and Linen Closets.** Light sources internal to drawers, cabinetry or linen closets are not required to comply with Table 150.0-A or be controlled by vacancy sensors provided that they are rated to consume no more than 5 watts of power, emit no more than 150 lumens, and are equipped with controls that automatically turn the lighting off when the drawer, cabinet or linen closet is closed.
§ 150.0(k)2A:	**Interior Switches and Controls.** All forward phase cut dimmers used with LED light sources must comply with NEMA SSL 7A.
§ 150.0(k)2B:	**Interior Switches and Controls.** Exhaust fans must be controlled separately from lighting systems. *
§ 150.0(k)2A:	**Accessible Controls.** Lighting must have readily accessible wall-mounted controls that allow the lighting to be manually turned on and off. *
§ 150.0(k)2B:	**Multiple Controls.** Controls must not bypass a dimmer, occupant sensor, or vacancy sensor function if the dimmer or sensor is installed to comply with § 150.0(k).
§ 150.0(k)2C:	**Mandatory Requirements.** Lighting controls must comply with the applicable requirements of § 110.9.
§ 150.0(k)2D:	**Energy Management Control Systems.** An energy management control system (EMCS) may be used to comply with dimming, occupancy, and control requirements if it provides the functionality of the specified control per § 110.9 and the physical controls specified in § 150.0(k)2A.
§ 150.0(k)2E:	**Automatic Shutoff Controls.** In bathrooms, garages, laundry rooms, utility rooms and walk-in closets, at least one installed luminaire must be controlled by an occupancy or vacancy sensor providing automatic-off functionality. Lighting inside drawers and cabinets with opaque fronts or doors must have controls that turn the light off when the drawer or door is closed.
§ 150.0(k)2F:	**Dimmers.** Lighting in habitable spaces (e.g., living rooms, dining rooms, kitchens, and bedrooms) must have readily accessible wall-mounted dimming controls that allow the lighting to be manually adjusted up and down. Forward phase cut dimmers controlling LED light sources in these spaces must comply with NEMA SSL 7A.
§ 150.0(k)2K:	**Independent controls.** Integrated lighting of exhaust fans shall be controlled independently from the fans. Lighting under cabinets or shelves, lighting in display cabinets, and switched outlets must be controlled separately from ceiling-installed lighting.
§ 150.0(k)3A:	**Residential Outdoor Lighting.** For single-family residential buildings, outdoor lighting permanently mounted to a residential building, or to other buildings on the same lot, must have a manual on/off switch and either a photocell and motion sensor or automatic time switch control) or an astronomical time clock. An energy management control system that provides the specified control functionality and meets all applicable requirements may be used to meet these requirements.
§ 150.0(k)4:	**Internally illuminated address signs.** Internally illuminated address signs must either comply with § 140.8 or consume no more than 5 watts of power.
§ 150.0(k)5:	**Residential Garages for Eight or More Vehicles.** Lighting for residential parking garages for eight or more vehicles must comply with the applicable requirements for nonresidential garages in §§ 110.9, 130.0, 130.1, 130.4, 140.6, and 141.0.

Solar Readiness:

§ 110.10(a)1:	**Single-family Residences.** Single-family residences located in subdivisions with 10 or more single-family residences and where the application for a tentative subdivision map for the residences has been deemed complete and approved by the enforcement agency, which do not have a photovoltaic system installed, must comply with the requirements of § 110.10(b)-(e).
§110.10(b)1A:	**Minimum Solar Zone Area.** The solar zone must have a minimum total area as described below. The solar zone must comply with access, pathway, smoke ventilation, and spacing requirements as specified in Title 24, Part 9 or other parts of Title 24 or in any requirements adopted by a local jurisdiction. The solar zone total area must be comprised of areas that have no dimension less than 5 feet and are no less than 80 square feet each for buildings with roof areas less than or equal to 10,000 square feet or no less than 160 square feet each for buildings with roof areas greater than 10,000 square feet. For single-family residences, the solar zone must be located on the roof or overhang of the building and have a total area no less than 250 square feet. *
§ 110.10(b)2:	**Azimuth.** All sections of the solar zone located on steep-sloped roofs must have an azimuth between 90-300° of true north.
§ 110.10(b)3A:	**Shading.** The solar zone must not contain any obstructions, including but not limited to: vents, chimneys, architectural features, and roof mounted equipment. *
§ 110.10(b)3B:	**Shading.** Any obstruction located on the roof or any other part of the building that projects above a solar zone must be located at least twice the horizontal distance of the height difference between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone, measured in the vertical plane. *
§ 110.10(b)4:	**Structural Design Loads on Construction Documents.** For areas of the roof designated as a solar zone, the structural design loads for roof dead load and roof live load must be clearly indicated on the construction documents.
§ 110.10(c):	**Interconnection Pathways.** The construction documents must indicate: a location reserved for inverters and metering equipment and a pathway reserved for routing of conduit from the solar zone to the point of interconnection with the electrical service; and for single-family residences and central water-heating systems, a pathway reserved for routing plumbing from the solar zone to the water-heating system.
§ 110.10(d):	**Documentation.** A copy of the construction documents or a comparable document indicating the information from § 110.10(b)-(c) must be provided to the occupant.
§ 110.10(e)1:	**Main Electrical Service Panel.** The main electrical service panel must have a minimum busbar rating of 200 amps.
§ 110.10(e)2:	**Main Electrical Service Panel.** The main electrical service panel must have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space must be permanently marked as "For Future Solar Electric."

Electric and Energy Storage Ready:

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2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(s)	**Energy Storage System (ESS) Ready.** All single-family residences must meet all of the following: Either ESS-ready interconnection equipment with backed up capacity of 60 amps or more and four or more ESS supplied branch circuits, or a dedicated raceway from the main service to a subpanel that supplies the branch circuits in § 150.0(s); at least four branch circuits must be identified and have their source collocated at a single panelboard suitable to be supplied by the ESS, with one circuit supplying the refrigerator, one lighting circuit near the primary exit, and one circuit supplying a sleeping room receptacle outlet; main panelboard must have a minimum busbar rating of 225 amps; sufficient space must be reserved to allow future installation of a system isolation equipment/transfer switch within 3' of the main panelboard, with raceways installed between the panelboard and the switch location to allow the connection of backup power source.
§ 150.0(t)	**Heat Pump Space Heater Ready.** Systems using gas or propane furnaces to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the furnace with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."
§ 150.0(u)	**Electric Cooktop Ready.** Systems using gas or propane cooktop to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the cooktop with circuit conductors rated at least 50 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."
§ 150.0(v)	**Electric Clothes Dryer Ready.** Clothes dryer locations with gas or propane plumbing to serve individual dwelling units must include: A dedicated unobstructed 240V branch circuit wiring installed within 3' of the dryer location with circuit conductors rated at least 30 amps with the blank cover identified as "240V ready;" and a reserved main electrical service panel space to allow for the installation of a double pole circuit breaker permanently marked as "For Future 240V use."

*Exceptions may apply.

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2022 Single-Family Residential Mandatory Requirements Summary

NOTE: Single-family residential buildings subject to the Energy Codes must comply with all applicable mandatory measures, regardless of the compliance approach used. Review the respective section for more information. (04/2022)

Building Envelope:

§ 110.6(a)1:	**Air Leakage.** Manufactured fenestration, exterior doors, and exterior pet doors must limit air leakage to 0.3 CFM per square foot or less when tested per NFRC-400, ASTM E283, or AAMA/WDMA/CSA 101/I.S.2/A440-2011. *
§ 110.6(a)5:	**Clearances.** Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 110.6(b):	**Field fabricated exterior doors and fenestration** products must use U-factors and solar heat gain coefficient (SHGC) values from Tables 110.6-A, 110.6-B, or JA4.5 for exterior doors. They must be caulked and/or weather-stripped. *
§ 110.7:	**Air Leakage.** All joints, penetrations, and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, or weather stripped.
§ 110.8(a):	**Insulation Certification by Manufacturers.** Insulation must be certified by the Department of Consumer Affairs, Bureau of Household Goods and Services (BHGS).
§ 110.8(g):	**Insulation Requirements for Heated Slab Floors.** Heated slab floors must be insulated per the requirements of § 110.8(g).
§ 110.8(i):	**Roofing Products Solar Reflectance and Thermal Emittance.** The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.8(i) and be labeled per §10-113 when the installation of a cool roof is specified on the CF1R.
§ 110.8(j):	**Radiant Barrier.** When required, radiant barriers must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.
§ 150.0(a):	**Roof Deck, Ceiling and Rafter Roof Insulation.** Roof decks in newly constructed attics in climate zones 4 and 8-16 area-weighted average U-factor not exceeding U-0.184. Ceiling and rafter roofs minimum R-22 insulation in wood-frame ceiling; or area-weighted average U-factor must not exceed 0.043. Rafter roof alterations minimum R-19 or area-weighted average U-factor of 0.054 or less. Attic access doors must have permanently attached insulation using adhesive or mechanical fasteners. The attic access must be gasketed to prevent air leakage. Insulation must be installed in direct contact with a roof or ceiling which is sealed to limit infiltration and exfiltration, as specified in § 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling. *
§ 150.0(b):	**Loose-fill Insulation.** Loose fill insulation must meet the manufacturer's required density for the labeled R-value.
§ 150.0(c):	**Wall Insulation.** Minimum R-13 insulation in 2x4 inch wood framing wall or have a U-factor of 0.102 or less, or R-20 in 2x6 inch wood framing or have a U-factor of 0.071 or less. Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102. Masonry walls must meet Tables 150.1-A or B. *
§ 150.0(d):	**Raised-floor Insulation.** Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor. *
§ 150.0(f):	**Slab Edge Insulation.** Slab edge insulation must meet all of the following: have a water absorption rate, for the insulation material alone without facings, no greater than 0.3 percent; have a water vapor permeance no greater than 2.0 perm per inch; be protected from physical damage and UV light deterioration; and, when installed as part of a heated slab floor, meet the requirements of § 110.8(g).
§ 150.0(g)1:	**Vapor Retarder.** In climate zones 1 through 16, the earth floor of unvented crawl space must be covered with a Class I or Class II vapor retarder. This requirement also applies to controlled ventilation crawl space for buildings complying with the exception to §150.0(d).
§ 150.0(g)2:	**Vapor Retarder.** In climate zones 14 and 16, a Class I or Class II vapor retarder must be installed on the conditioned space side of all insulation in all exterior walls, vented attics, and unvented attics with air-permeable insulation.
§ 150.0(q):	**Fenestration Products.** Fenestration, including skylights, separating conditioned space from unconditioned space or outdoors must have a maximum U-factor of 0.45; or area-weighted average U-factor of all fenestration must not exceed 0.45. *

Fireplaces, Decorative Gas Appliances, and Gas Log:

§ 110.5(e)	**Pilot Light.** Continuously burning pilot lights are not allowed for indoor and outdoor fireplaces.
§ 150.0(e)1:	**Closable Doors.** Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.
§ 150.0(e)2:	**Combustion Intake.** Masonry or factory-built fireplaces must have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper or combustion-air control device. *
§ 150.0(e)3:	**Flue Damper.** Masonry or factory-built fireplaces must have a flue damper with a readily accessible control. *

Space Conditioning, Water Heating, and Plumbing System:

§ 110.0-§ 110.3:	**Certification.** Heating, ventilation, and air conditioning (HVAC) equipment, water heaters, showerheads, faucets, and all other regulated appliances must be certified by the manufacturer to the California Energy Commission.
§ 110.2(a):	**HVAC Efficiency.** Equipment must meet the applicable efficiency requirements in Table 110.2-A through Table 110.2-N. *
§ 110.2(b):	**Controls for Heat Pumps with Supplementary Electric Resistance Heaters.** Heat pumps with supplementary electric resistance heaters must have controls that prevent supplementary heater operation when the heating load can be met by the heat pump alone; and in which the cut-on temperature for compression heating is higher than the cut-on temperature for supplementary heating, and the cut-off temperature for compression heating is higher than the cut-off temperature for supplementary heating.
§ 110.2(c):	**Thermostats.** All heating or cooling systems not controlled by a central energy management control system (EMCS) must have a setback thermostat. *
§ 110.3(c)3:	**Insulation.** Unfired service water heater storage tanks and solar water-heating backup tanks must have adequate insulation, or tank surface heat loss rating.
§ 110.3(c)6:	**Isolation Valves.** Instantaneous water heaters with an input rating greater than 6.8 kBtu per hour (2 kW) must have isolation valves with hose bibs or other fittings on both cold and hot water lines to allow for flushing the water heater when the valves are closed.

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2022 Single-Family Residential Mandatory Requirements Summary

§ 110.5:	**Pilot Lights.** Continuously burning pilot lights are prohibited for natural gas: fan-type central furnaces; household cooking appliances (except appliances without an electrical supply voltage connection with pilot lights that consume less than 150 Btu per hour); and pool and spa heaters. *
§ 150.0(h)1:	**Building Cooling and Heating Loads.** Heating and/or cooling loads are calculated in accordance with the ASHRAE Handbook, Equipment Volume, Applications Volume, and Fundamentals Volume; the SMACNA Residential Comfort System Installation Standards Manual; or the ACCA Manual J using design conditions specified in § 150.0(h)2.
§ 150.0(h)3A:	**Clearances.** Air conditioner and heat pump outdoor condensing units must have a clearance of at least five feet from the outlet of any dryer.
§ 150.0(h)3B:	**Liquid Line Drier.** Air conditioners and heat pump systems must be equipped with liquid line filter driers if required, as specified by the manufacturer's instructions.
§ 150.0(j)1:	**Water Piping, Solar Water-heating System Piping, and Space Conditioning System Line Insulation.** All domestic hot water piping must be insulated as specified in § 609.11 of the California Plumbing Code. *
§ 150.0(j)2:	**Insulation Protection.** Piping insulation must be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind as required by §120.3(b). Insulation exposed to weather must be water retardant and protected from UV light (no adhesive tapes). Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space must include, or be protected by, a Class I or Class II vapor retarder. Pipe insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve.
§ 150.0(n)1:	**Gas or Propane Water Heating Systems.** Systems using gas or propane water heaters to serve individual dwelling units must designate a space at least 2.5' x 2.5' x 7' suitable for the future installation of a heat pump water heater, and meet electrical and plumbing requirements, based on the distance between this designated space and the water heater location; and a condensate drain no more than 2' higher than the base of the water heater.
§ 150.0(n)3:	**Solar Water-heating Systems.** Solar water-heating systems and collectors must be certified and rated by the Solar Rating and Certification Corporation (SRCC), the International Association of Plumbing and Mechanical Officials, Research and Testing (IAPMO R&T), or by a listing agency that is approved by the executive director.

Ducts and Fans:

§ 110.8(d)3:	**Ducts.** Insulation installed on an existing space-conditioning duct must comply with § 604.0 of the California Mechanical Code (CMC). If a contractor installs the insulation, the contractor must certify to the customer, in writing, that the insulation meets this requirement.
§ 150.0(m)1:	**CMC Compliance.** All air-distribution system ducts and plenums must meet CMC §§ 601.0-605.0 and ANSI/SMACNA-006-2006 HVAC Duct Construction Standards Metal and Flexible 3rd Edition. Portions of supply-air and return-air ducts and plenums must be insulated to R-6.0 or higher; ducts located entirely in conditioned space as confirmed through field verification and diagnostic testing (RA3.1.4.3.8) do not require insulation. Connections of metal ducts and inner core of flexible ducts must be mechanically fastened. Openings must be sealed with mastic, tape, or other duct-closure system that meets the applicable UL requirements, or aerosol sealant that meets UL 723. The combination of mastic and either mesh or tape must be used to seal openings greater than ¼". If mastic or tape is used. Building cavities, air handler support platforms, and plenums designed or constructed with materials other than sealed sheet metal, duct board or flexible duct must not be used to convey conditioned air. Building cavities and support platforms may contain ducts; ducts installed in these spaces must not be compressed.
§ 150.0(m)2:	**Factory-Fabricated Duct Systems.** Factory-fabricated duct systems must comply with applicable requirements for duct construction, connections, and closures; joints and seams of duct systems and their components must not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and draw bands.
§ 150.0(m)3:	**Field-Fabricated Duct Systems.** Field-fabricated duct systems must comply with applicable requirements for: pressure-sensitive tapes, mastics, sealants, and other requirements specified for duct construction.
§ 150.0(m)7:	**Backdraft Damper.** Fan systems that exchange air between the conditioned space and outdoors must have backdraft or automatic dampers.
§ 150.0(m)8:	**Gravity Ventilation Dampers.** Gravity ventilating systems serving conditioned space must have either automatic or readily accessible, manually operated dampers in all openings to the outside, except combustion inlet and outlet air openings and elevator shaft vents.
§ 150.0(m)9:	**Protection of Insulation.** Insulation must be protected from damage due tosunlight, moisture, equipment maintenance, and wind. Insulation exposed to weather must be suitable for outdoor service (e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover). Cellular foam insulation must be protected as above or painted with a water retardant and solar radiation-resistant coating.
§ 150.0(m)10:	**Porous Inner Core Flex Duct.** Porous inner cores of flex ducts must have a non-porous layer or air barrier between the inner core and outer vapor barrier.
§ 150.0(m)11:	**Duct System Sealing and Leakage Test.** When space conditioning systems use forced air duct systems to supply conditioned air to an occupiable space, the ducts must be sealed and duct leakage tested, as confirmed through field verification and diagnostic testing, in accordance with Reference Residential Appendix RA3.1.
§ 150.0(m)12:	**Air Filtration.** Space conditioning systems with ducts exceeding 10 feet and the supply side of ventilation systems must have MERV 13 or equivalent filters. Filters for space conditioning systems must have a two inch depth or can be one inch if sized per Equation 150.0-A. Clean-filter pressure drop and labeling must meet the requirements in §150.0(m)12. Filters must be accessible for regular service. Filter racks or grilles must use gaskets, sealing, or other means to close gaps around the inserted filters to and prevents air from bypassing the filter. *

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2022 Single-Family Residential Mandatory Requirements Summary

§ 150.0(m)13:	**Space Conditioning System Airflow Rate and Fan Efficacy.** Space conditioning systems that use ducts to supply cooling must have a hole for the placement of a static pressure probe, or a permanently installed static pressure probe in the supply plenum. Airflow must be ≥ 350 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.45 watts per CFM for gas furnace air handlers and ≤ 0.58 watts per CFM for all others. Small duct high velocity systems must provide an airflow ≥ 250 CFM per ton of nominal cooling capacity, and an air-handling unit fan efficacy ≤ 0.62 watts per CFM. Field verification testing is required in accordance with Reference Residential Appendix RA3.3. *

Ventilation and Indoor Air Quality:

§ 150.0(o)1:	**Requirements for Ventilation and Indoor Air Quality.** All dwelling units must meet the requirements of ASHRAE Standard 62.2, Ventilation and Acceptable Indoor Air Quality in Residential Buildings subject to the amendments specified in § 150.0(o)1. *
§ 150.0(o)1B:	**Central Fan Integrated (CFI) Ventilation Systems.** Continuous operation of CFI air handlers is not allowed to provide the whole-dwelling unit ventilation airflow required per §150.0(o)1C. A motorized damper(s) must be installed on the ventilation duct(s) that prevents all airflow through the space conditioning duct system when the damper(s) is closed andcontrolled per §150.0(o)1Bii&Iv. CFI ventilation systems must have controls that track outdoor air ventilation run time, and either open or close the motorized damper(s) for compliance with §150.0(o)1C.
§ 150.0(o)1C:	**Whole-Dwelling Unit Mechanical Ventilation for Single-Family Detached and townhouses .** Single-family detached dwelling units, and attached dwelling units not sharing ceilings or floors with other dwelling units, occupiable spaces, public garages, or commercial spaces must have mechanical ventilation airflow specified in § 150.0(o)1CI-iii.
§ 150.0(o)1G:	**Local Mechanical Exhaust.** Kitchens and bathrooms must have local mechanical exhaust; nonenclosed kitchens must have demand-controlled exhaust system meeting requirements of §150.0(o)1GiiLenclosed kitchens and bathrooms can use demand-controlled or continuous exhaust meeting §150.0(o)1GiiI-Iv. Airflow must be measured by the installer per §150.0(o)1Gv, and rated for sound per §150.0(o)1Gvi. *
§ 150.0(o)1H&I:	**Airflow Measurement and Sound Ratings of Whole-Dwelling Unit Ventilation Systems.** The airflow required per § 150.0(o)1C must be measured by using a flow hood, flow grid, or other airflow measuring device at the fan's inlet or outlet terminals/grilles per Reference Residential Appendix RA3.7. Whole-Dwelling unit ventilation systems must be rated for sound per ASHRAE 62.2 §7.2 at no less than the minimum airflow rate required by §150.0(o)1C.
§ 150.0(o)2:	**Field Verification and Diagnostic Testing.** Whole-Dwelling Unit ventilation airflow, vented range hood airflow and sound rating, and HRV and ERV fan efficacy must be verified in accordance with Reference Residential Appendix RA3.7. Vented range hoods must be verified per Reference Residential Appendix RA3.7.4.3 to confirm if it is rated by HVI or AHAM to comply with the airflow rates and sound requirements per §150.0(o)1G

Pool and Spa Systems and Equipment:

§ 110.4(a):	**Certification by Manufacturers.** Any pool or spa heating system or equipment must be certified to have all of the following: compliance with the Appliance Efficiency Regulations and listing in MAEDbS; an on-off switch mounted outside of the heater that allows shutting off the heater without adjusting the thermostat setting; a permanent weatherproof plate or card with operating instructions; and must not use electric resistance heating. *
§ 110.4(b)1:	**Piping.** Any pool or spa heating system or equipment must be installed with at least 36 inches of pipe between the filter and the heater, or dedicated suction and return lines, or built-in or built-up connections to allow for future solar heating.
§ 110.4(b)2:	**Covers.** Outdoor pools or spas that have a heat pump or gas heater must have a cover.
§ 110.4(b)3:	**Directional Inlets and Time Switches for Pools.** Pools must have directional inlets that adequately mix the pool water, and a time switch that will allow all pumps to be set or programmed to run only during off-peak electric demand periods.
§ 110.5:	**Pilot Light.** Natural gas pool and spa heaters must not have a continuously burning pilot light.
§ 150.0(p):	**Pool Systems and Equipment Installation.** Residential pool systems or equipment must meet the specified requirements for pump sizing, flow rate, piping, filters, and valves. *

Lighting:

§ 110.9:	**Lighting Controls and Components.** All lighting control devices and systems, ballasts, and luminaires must meet the applicable requirements of § 110.9. *
§ 150.0(k)1A:	**Luminaire Efficacy.** All installed luminaires must meet the requirements in Table 150.0-A, except lighting integral to exhaust fans, kitchen range hoods, bath vanity mirrors, and garage door openers; navigation lighting less than 5 watts; and lighting internal to drawers, cabinets, and linen closets with an efficacy of at least 45 lumens per watt.
§ 150.0(k)1B:	**Screw based luminaires.** Screw based luminaires must contain lamps that comply with Reference Joint Appendix JA8. *
§ 150.0(k)1C:	**Recessed Downlight Luminaires in Ceilings.** Luminaires recessed into ceilings must not contain screw based sockets, must be airtight, and must be sealed with a gasket or caulk. California Electrical Code § 410.116 must also be met.
§ 150.0(k)1D:	**Light Sources in Enclosed or Recessed Luminaires.** Lamps and other separable light sources that are not compliant with the JA8 elevated temperature requirements, including marking requirements, must not be installed in enclosed or recessed luminaires.
§ 150.0(k)1E:	**Blank Electrical Boxes.** The number of electrical boxes that are more than five feet above the finished floor and do not contain a luminaire or other device shall be no more than the number of bedrooms. These boxes must be served by a dimmer, vacancy sensor control, low voltage wiring, or fan speed control.
§ 150.0(k)1F:	**Lighting Integral to Exhaust Fans.** Lighting integral to exhaust fans (except when installed by the manufacturer in kitchen exhaust hoods) must meet the applicable requirements of § 150.0(k). *

5/6/22

HVAC SYSTEM HEATING AND COOLING LOADS SUMMARY

Project Name		Date
Option # 1 Duplex Unit 2		24-06-2023
System Name		Floor Area
HVAC System		996

ENGINEERING CHECKS	
Number of Systems	1
Heating System	
Output per System	30,000
Total Output (Btuh)	30,000
Output (Btuh/sqft)	30.1
Cooling System	
Output per System	27,000
Total Output (Btuh)	27,000
Total Output (Tons)	2.3
Total Output (Btuh/sqft)	27.1
Total Output (sqft/Ton)	442.7
Air System	
CFM per System	800
Airflow (cfm)	800
Airflow (cfm/sqft)	0.80
Airflow (cfm/Ton)	355.6
Outside Air (%)	0.0%
Outside Air (cfm/sqft)	0.00
Note: values above given at ARI conditions	

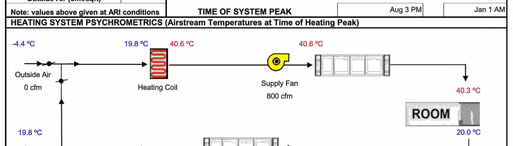
SYSTEM LOAD

	COIL COOLING PEAK CFM	COIL COOLING PEAK Sensible	COIL COOLING PEAK Latent	COIL HTG. PEAK CFM	COIL HTG. PEAK Sensible
Total Room Loads	422	8,793	494	243	9,490
Return Vented Lighting		0			
Return Air Ducts		405			371
Return Fan		0			0
Ventilation	0	0	0	0	0
Supply Fan		0			0
Supply Air Ducts		405			371
TOTAL SYSTEM LOAD		9,604	494		10,231

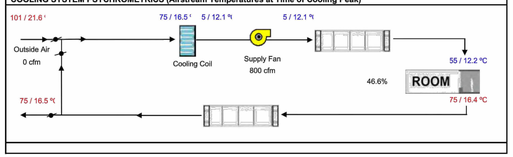
HVAC EQUIPMENT SELECTION

LH248HV4	23,096	974		17,721
Total Adjusted System Output (Adjusted for Peak Design conditions)	23,096	974		17,721
TIME OF SYSTEM PEAK		Aug 3 PM		Jan 1 AM

HEATING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Heating Peak)



COOLING SYSTEM PSYCHROMETRICS (Airstream Temperatures at Time of Cooling Peak)



DUPLEX DWELLING UNIT

OPTION #1

PROJECT

DUPLEX DWELLING UNIT

PWP23-005

DEPARTMENT OF PUBLIC WORKS AND PLANNING

CAPITAL PROJECTS DIVISION

2220 Tulare St., Ste. 720, Fresno, CA. 93721
Phone: (559) 262-4212 Fax: (559) 262-4879

SEAL & SIGNATURE

LICENSED ARCHITECT — ROBINA R. WRIGHT — NO. C-32283 — RENEWAL DATE 06/30/2025 — STATE OF CALIFORNIA

UPDATE

JUNE 29, 2023

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TITLE

TITLE 24 MANDATORY REQUIREMENTS

SCALE

MM-2.1

ISSUE DATE	JOB NUMBER
MARCH 7, 2023	2023_10
DRAWN BY	CHECKED BY
Author	Checker

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