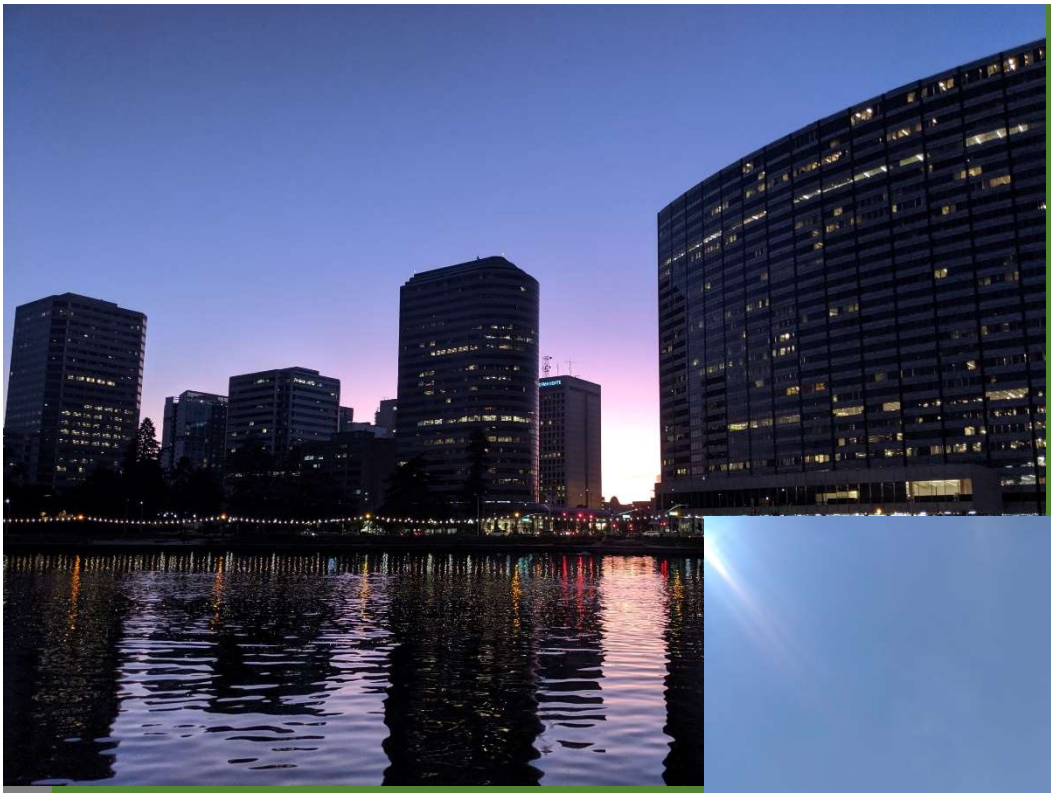


VOLUME

2

CITY OF OAKLAND

RESIDENTIAL CONSTRUCTION INSPECTION MANUAL

Planning and Building Department| Bureau of Building| Permit Inspection Services

Overview

A standard operating procedure for each specific inspection and for all the residential project types that we inspect would be too complex. Therefore, we are providing in this manual the most typical inspections performed both for residential projects that are new from the ground up and for additions, repairs, and alterations.

The information contained in this manual is specific to the City of Oakland and no other jurisdictions. It is also not intended to be used as a reference or a basis for all residential projects.

Each project is different and may require additional, specific, or other methods.

Readers of this manual are strongly encouraged to consult with a design professional or licensed construction individuals for specific project guidance.

Familiarity with California Residential Code (CRC), California Building Code (CBC), California Electrical Code (CEC), California Plumbing Code (CPC), California Mechanical Code (CMC), California Energy Code (CENC), California Green Code (CalGREEN), and California Existing Building Code (CEXBC) is recommended to make good use of this manual.

IMPORTANT ITEMS TO REMEMBER:

The City of Oakland has amendments to the above codes. Please access amendments at:

Oakland Amendments to California Building Codes.

It is the responsibility of the permit holder or owner to request inspections before covering any work

Complete, intact, approved Construction Documents with all approved revisions, job card, CF-1R (Energy Calculations aka Title 24), and Conditions of Approval are required to be on site for ALL inspections

Valid and Issued permits are required for inspections

An individual with direct knowledge aged 18 or over is required to be present for inspection and provide safe means of access to all areas that need inspections. Ladders, lights, scaffolding, etc as necessary

Job site must be maintained safe and in compliance with all applicable codes and approved plans. A stop work order or suspension of inspections may be issued for serious safety violations or work that exceeds the scope of issued permits/approved plans. NOTE: *Removal or disassembly of greater than 50% of a structure may result in the structure being classified as a new building when rebuilt*. See Code Bulletin D18-001

During the construction phase, inspections by City Inspectors are required prior to:

Placing concrete or grout

Covering electrical, plumbing, or mechanical work

Covering floor framing

Covering interior sides of wall framing

Taping gypsum wallboard

Applying stucco

Insulation

Shower Walls prior to tiling

Exterior & Interior shear nailing

Waterproof membrane at exterior balconies, stairs, etc.

Roof plywood nailing

Roof framing

Shafts

Fire protection

Introduction to Field Inspections

If a builder builds a house for someone, even though he has not yet completed it; if then the walls seem toppling, the builder must make the walls solid from his own means. -CODE OF HAMMURABI

Regulatory Codes for construction have existed in one shape or another since the time of the Babylonians. From the excerpt of the Hammurabi Code (1772 B.C.) above, one can understand the fact that for thousands of years' safety in construction has been considered important enough to society to be addressed in books of law. Modern building codes are an extension of the ancient regulations. Modern Building Codes still maintain structure safety as the main objective. However, building codes also include standards and descriptive methods of construction that must be enforced. The enforcement function is directly placed by jurisdictions upon a Building Official, Plan Check Engineers, and Building Inspectors.

Field enforcement of the regulations contained in Building Codes fall in the hands of the Building Inspector, who ensures that all construction projects adhere to any approved construction documents/plans, applicable building codes, and other applicable codes regulations. Aside from regulatory mandates, a Building Inspector may assist builders during the inspection process to resolve construction related problems, foresee possible code related issues, offer suggestions, and deal with members of the public who may be interested or concerned with a project. Interaction with people involved in construction projects is the most important part of a Building Inspectors job.

The building inspection is typically conducted after the MEP inspections have passed. City of Oakland Inspectors conduct inspections to determine that the project conforms to the approved construction documents and minimum applicable code requirements are met for each project. Inspection results are entered into the electronic permit system.

All approvals, partial or pass, shall be described in clear language and any areas approved to be covered will be described accordingly or noted in the approved plans.

If a Correction is necessary or the inspection did not pass the Inspector will email the correction notice to the field contact/representative. Inspector can provide if requested code sections to support correction notice items as soon as practical, typically next working day.

For projects requiring a private third-party special inspection, testing, rating, or observation, please see below for some of the typical third-party reports required (NOTE: *other reports may be required specific to your project. Please consult your approved plans or applicable codes*):

Special Inspector as required under Chapter 17 of the California Building Code- Special Inspector shall inspect and verify installation of items and provide a report prior to City of Oakland inspection. The report must be made available to City of Oakland inspector. **Special Inspections are not in lieu of required City of Oakland inspections. Only City of Oakland inspector can approve work.**

GreenPoint rater- GreenPoint rater if required must be involved at start of project and during the course of construction to verify compliance with Green measures through the project. **GreenPoint raters are not in lieu of required City of Oakland inspections. Only City of Oakland inspector can approve work.**

CalGreen Mandatory Measures- A design professional shall be retained to verify compliance with CalGreen Residential Mandatory Measures during construction. A letter certifying compliance or submittal of the CalGreen Residential Mandatory Measures Checklist will be required at FINAL. **Design Professionals for CalGreen verification are not in lieu of required City of Oakland inspections. Only City of Oakland inspector can approve work.**

The City of Oakland cannot recommend any third-party individual, company, or firm for the above items.

Table of Contents

Chapter 2 Pre-Construction

Upon issuance of a building permit and approval of construction documents, but before construction activities begin. The permittee and/or builder needs to prepare the site for the actual start of work.

Part of the site preparation may involve establishing “Best Management Practices” to ensure that a safe, clean, and well-organized job site is achieved during construction activities.

Sites shall have at minimum:

1- Property address that is clearly visible from road
2- Toilet Facilities are on-site. If Portable Facility, it must have secondary containment and be within private property and not in the Right of Way.
3- Trash container or continuous trash removal. Sites shall be clean and safe for inspection (Litter Free Job Site Handout)
4- Dust control, erosion control, and other applicable stormwater control measures are in place.
5- Any protected areas (trees, creeks, watersheds, other) are protected and maintained as such.
6- Any other applicable safety measures as mandated by City, County, State, or Federal Agency

PRE-CONSTRUCTION CHECKLIST			
Project Address			
Building Permit			
PZ Permit			
REQUIRED	OK	C /N	**Required Documents available on site:**
			Approved plans
			Construction Management Plan
			Conditions of approval
			Traffic Control Plan
			Creek protection permit and plan
			Tree permits with required protection measures
			Complaint Log (see attached example)
			Obstruction permits
			Other specific items (Specify what these are if any)
			Confirmation of Notification of Adjacent Neighbors:
REQUIRED	OK	C /N	**Required measures in place:**
			Construction Signage (see attached example)
			Construction entrance
			Pedestrian protection
			Tire wash stations
			Water supply
			Dust control
			Sanitary facilities, with secondary containment
			Sound barriers
			Debris fencing
			Security fencing
			Security lighting
			Temporary power
			Erosion Controls, drain inlet protection, wattles silt fence etc.

			Material and equipment staging and storage areas
			Parking Controls

Chapter 3 FOUNDATION INSPECTION

The foundation inspection is typically the first inspection that will be required, unless there is underfloor plumbing that needs to be laid out before any foundation work can take place. All foundation related work shall be ready for inspection, this includes not only having all forms, rebar, moisture barrier, sand/gravel, applicable hardware in place but will also necessitate that 1- any required Special Inspection reports be made available for the City of Oakland inspector, and 2- that formwork certification and/or licensed surveyor stakes be on site.

Only exterior piers, deck footings, and stem/retaining walls inspections may be phased. As per above any required Special Inspection reports must be on-site and available for City of Oakland inspector to review prior to OK to Pour.

If all work is complete and per approved construction documents and applicable code, the City of Oakland inspector will grant an OK to Pour.

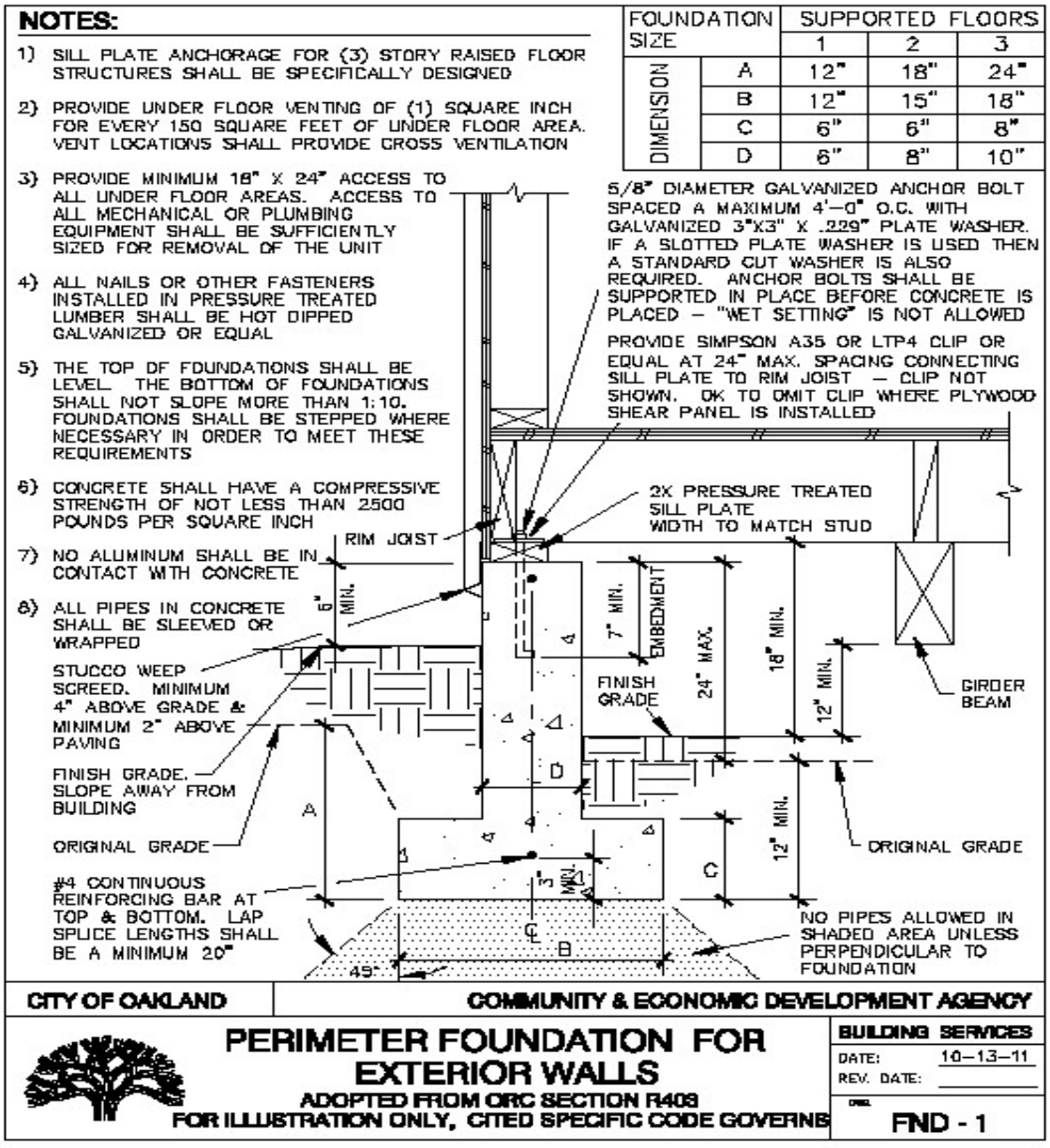
FOUNDATION INSPECTION		
CONSTRUCTION DOCUMENTS AND PERMITS		
Address to be posted, visible from road. OMC 15.40.010, CRC §R319		
Toilet facilities on-site. If Portable toilet facility, secondary containment is mandatory. OMC15.04.1.170, CPC §422.5		
Construction site is safe for inspection. Boards with nails and excessive Debris removed. (Litter-Free job sites handout)		
Best Management Practices (BMP) are in place for storm-water control		
Approved construction documents and permit card are on the job-site CRC §R106.3.1, R105.7 & R109.3		
Any protected areas (trees, creeks, watersheds, other) are protected and maintained as such. OPC COAs		
Compaction /soils, Special Inspection, Engineer's structural observation reports on site. Refer to approved Construction Documents. CBC §1803, CBC §1704.2.4, CBC §1704.5		
FORMS AND SETBACKS		
Property corners identified and property lines identified with string lines. Survey may be required.		
Formwork certification prepared by licensed design professional on-site.		
Footings including interior pier footings are constructed per the approved plans CRC Chapter 4.		
All forms completed and adequately braced. CRC §R404.1.2.3.6		

The top of the stem wall which supports wood framing and sheathing is at least 8" above finished grade. CRC §R317		
The bottoms of footings are stepped on slopes over 10%. CRC §R403.1.5		
The footings/piers are keyed into undisturbed soil a minimum of 12" for 1 story, 18" for 2 Stories, and 24" for 3 stories. Refer to approved construction documents. CRC Chapter 4.		
Stumps and roots have been removed to a depth of 12" CRC §R408.5		
Water, mud, loose dirt, rocks, and debris are removed from trenches		
HARDWARE AND STEEL		
All reinforcing steel is tied in place, including dowels CRC §R403		
Size and grade of rebar is per plans. Reinforcement is adequately supported Minimum 3" clearance to earth on all sides. Minimum 1½" clearance to outside forms and ¾" to inside forms. Splices are a minimum 40 bar diameters or per approved plans. Reinforcing is free of scale and rust, & oil CRC §R403		
Hold-down bolts and hold-down straps are secured in place. Bolts have sufficient projection for 2x or 3x sill plate. Size, spacing and locations are per the approved plans. Anchor bolts shall be allowed to be wet set and shall be on site at time of inspection. CRC §R403		
Size, spacing and locations are per the approved plans, min. 4' spacing. Anchor bolts secured on form. **WET SET ANCHOR BOLTS ARE NOT ALLOWED**		
5/8" diameter galvanized anchor bolts spaced a max. 4'o.c. with galvanized 3"x3"x.229" plate washer. If slotted washer is used an additional standard washer is required		
Minimum 2 bolts per sill piece. Edge bolts no more than 12" inches from edge or closer than 7 bolt diameters.		

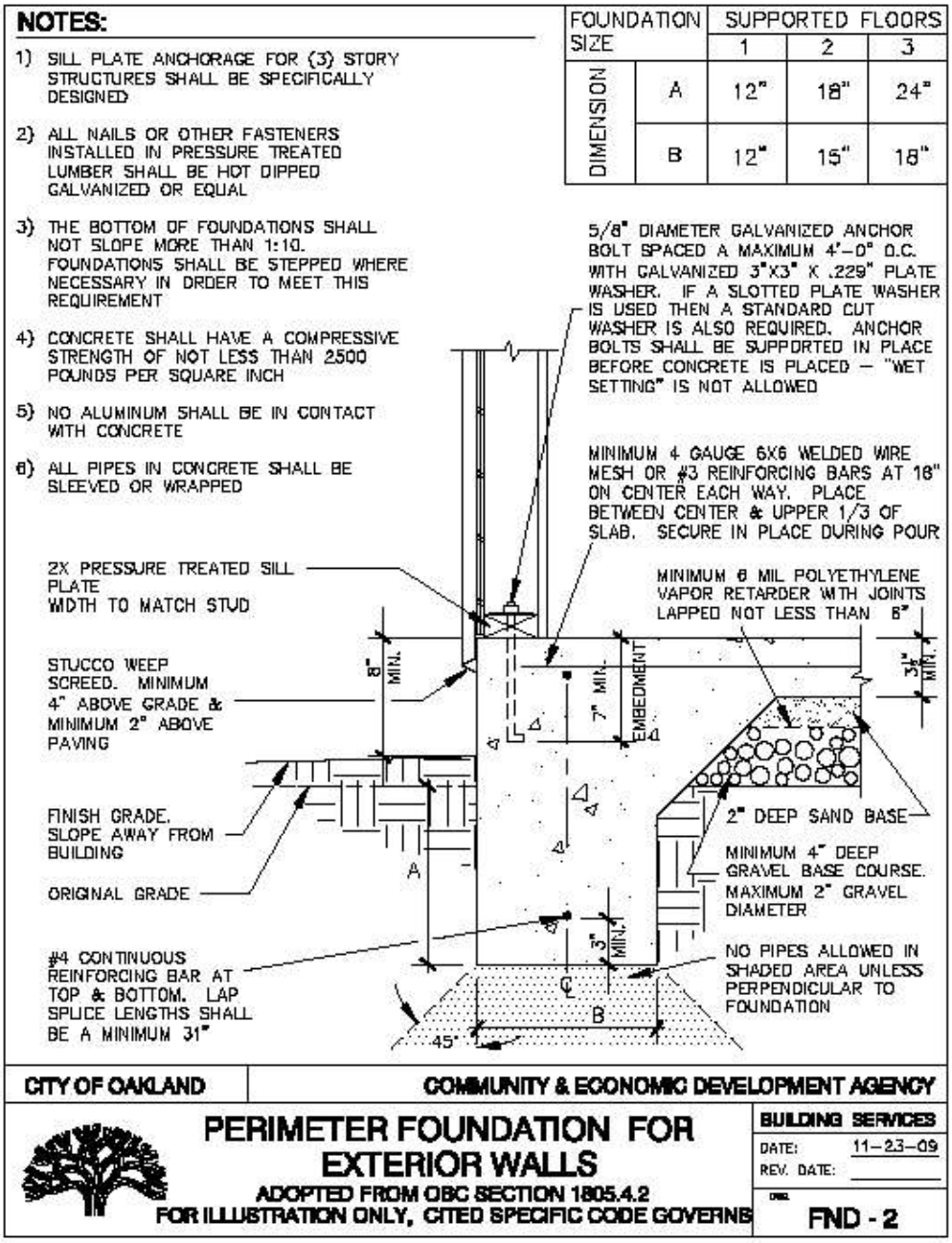
Anchor bolts and washers in contact with pressure-treated wood are galvanized. CRC §R317.3 Exception: 1 ½" diameter or greater steel bolts		
All fasteners into pressure treated lumber are galvanized		
New to existing connecting dowels min 7" embedment and equal size to reinforcement bars		
Post bases are set in place (Verify min. 3" concrete side cover per manufacturer's instructions).		
Required pre-manufacture shear wall templates and bolts in place.		
Provisions for an 18"x24" under-floor access are provided. CRC §R408.4		
Bottom of Joists and beams within building to be maintained 18" and 12" from grade respectively above grade.		
SLABS *(Non-Structural on grade porches and patio slabs do not require inspection)*		
Slab on grade has 4" gravel, 6 mil polyethylene moisture barrier if required. CRC §R506		
Vehicle bollard provisions for gas utilization equipment CPC §507.13.1		
Reinforcement is per plan		
The tops of interior footings are cleared of sand and gravel CRC §R401		
String lines are pulled across forms to verify slab thickness. Minimum 3½". CRC §R506.1		
Insulation requirements for heated floor slabs. CEC §110.8(g)		
Hydronic heat piping pressure test shall not be less than 100psi. CMC §1201.3.9.2		
PLUMBING		
Waste and water piping systems completed and on test CPC §712/609.4		

Sleeve for waste piping is installed through foundation CPC §312.10		
Piping shall be protected against direct contact with concrete and shall not be directly embedded in concrete CPC §312.2		
Waste plumbing laying on the ground is adequately bedded for the entire length; not supported on rebar stakes. CPC §313.3		
Gas lines are not allowed under ground, beneath structure or slabs unless installed to comply with CPC §1210.1.6 (Provide approved details for gas pipe sleeving and venting) CPC §1210.1.6		
ELECTRICAL		
Grounding electrode (UFER) is installed. Twenty feet of ½" rebar or #4 bare copper wire encased in at least 2" of concrete, near the bottom of the footing. CEC §250.52		
Underground service entrance conduit is in place for recessed service panels. CEC §230.32		
Reconnect grounding electrode within the first 5' of water supply as it enters the building		

T- FOOTING (Typical Details)



SLAB FOUNDATION (TYPICAL DETAILS)

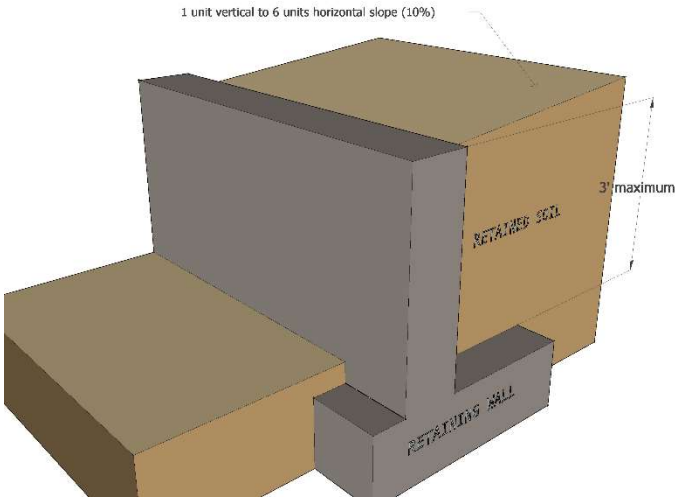


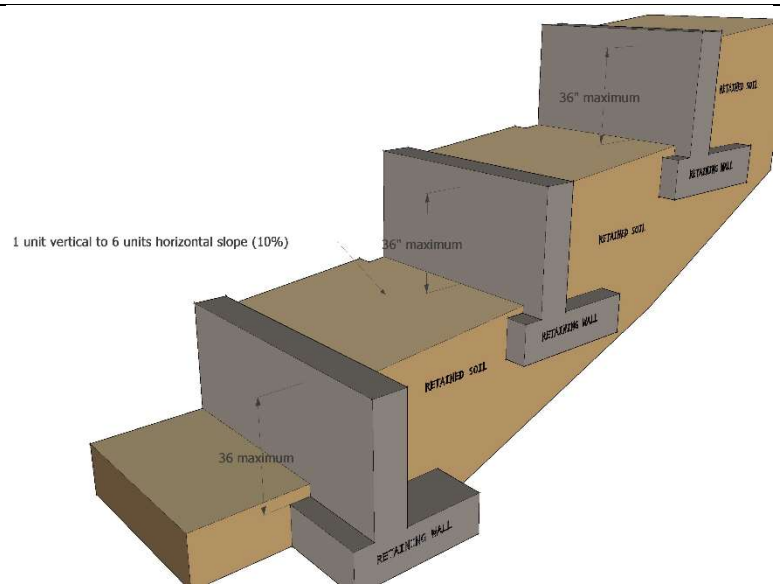
RETAINING WALLS

Retaining walls meeting the following criteria are one of the items exempted from the permitting process.

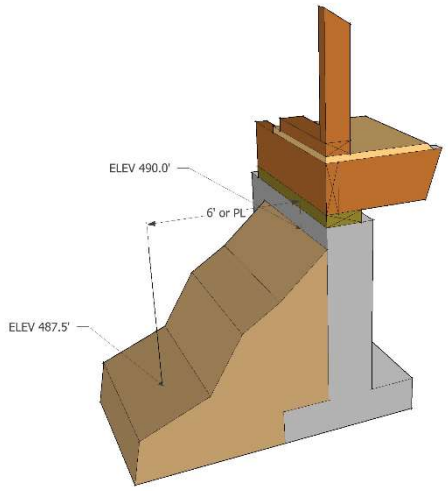
- Retaining walls that are not over 4 feet in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge or impounding Class I, II or IIIA liquids.

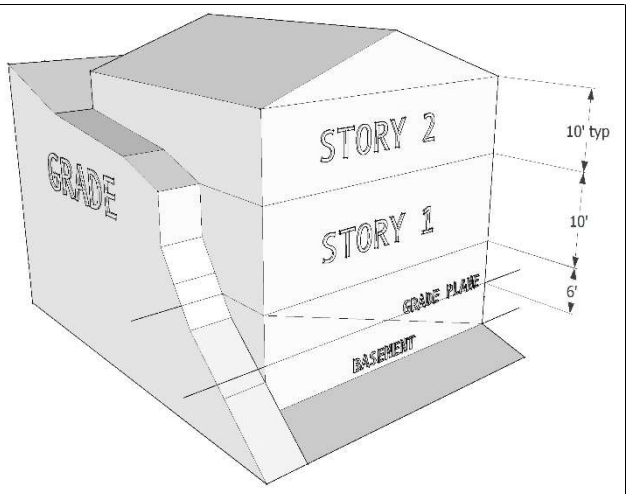
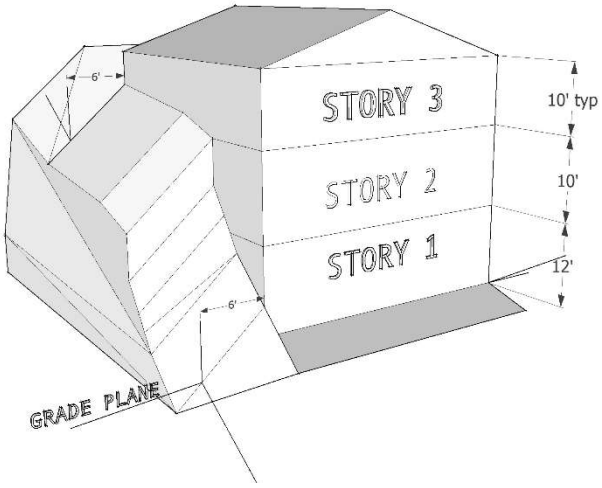
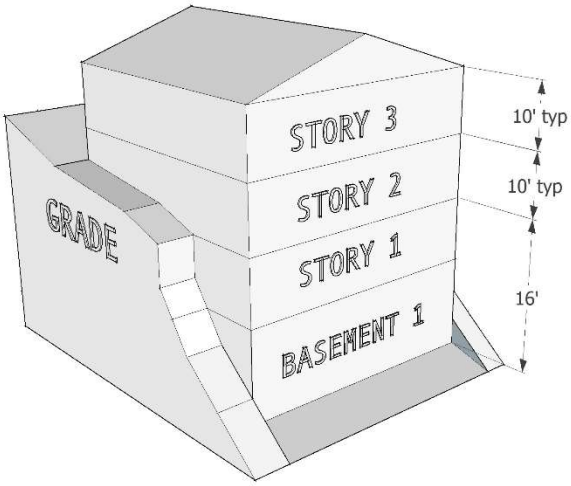
However, in the City of Oakland RETAINING WALLS shall be constructed within the following constraints in order to remain exempt from a building permit:

A. *Walls with 3 feet maximum retained earth and a back-slope of 1 unit vertical to 6 units horizontal (or 10% slope), or flatter, does not require a building permit.* *Any retaining wall requiring a permit will require engineering calculations*	

B. *Terracing walls are allowed to be constructed using the slope constraints as a single wall.* *Any retaining wall requiring a permit will require engineering calculations*	

HOW TO DEFINE NUMBER OF STORIES FOR A BUILDING

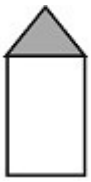
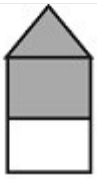
<table>
<tr><td></td><td colspan="2">Definition</td></tr>
<tr><td>Grade Plane</td><td colspan="2">A reference plane representing the average of finished ground level adjoining the building at exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 feet from the building, between the building and a point 6 feet from the building.</td></tr>
<tr><td></td><td>The grade elevation that is used in determining the Grade Plane elevations is 487.5’</td><td> 
</td></tr>
<tr><td></td><td colspan="2">Determination of grade plane where grade slopes away from the exterior wall</td></tr>
<tr><td rowspan="3">Story Above Grade Plane</td><td colspan="2">Any story having its finished floor surface entirely above grade plane, or in which the finished surface of the floor next above is:</td></tr>
<tr><td>1</td><td>More than 6 feet above grade plane; or</td></tr>
<tr><td>2</td><td>More than 12 feet above the finished ground level at any point</td></tr>
</table>

	Grade line is represented by cross line on basement front elevation. Grade Plane line is the average between lowest and higher elevation points.	
	Determination of grade plane and basement based on exterior wall average elevations	
Story	That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above. It is measured as the vertical distance from top to top of two successive tiers of beams or finished floor surfaces and, for the topmost *story,* from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.	
Basement	A *story* that is not a *story above grade plane*	
		
Site conditions may define all level as Stories regardless of how much the building is considered to be underground	*Story 1is a Story above Grade Plane because the floor of the story is above 12' above finished level at any point. (rules regarding underground percent areas no longer apply)*	

R305.1.1	Portions of *basements* that do not contain *habitable space,* hallways, bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches. **Exception:** Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches of the finished floor.
OMC amendment	15.04.1030. Replace 7 feet with "7 feet 6 inches in habitable spaces, 7 feet in non-habitable spaces,"
Story Height R301.3	For wood wall framing, the laterally unsupported bearing wall stud height permitted by **(=10'**) plus a height of floor framing not to exceed 16 inches. **Exception:** For wood framed wall buildings with bracing in accordance with applicable tables the wall stud clear height used to determine the maximum permitted *story height* may be increased to 12 feet without requiring an engineered design for the building wind and seismic force resisting systems provided that the length of bracing required by applicable table is increased by multiplying by a factor of 1.10 and the length of bracing required by applicable table is increased by multiplying by a factor of 1.20. Wall studs are still subject to the requirements of this section.
Building Height	The vertical distance from *grade plane* to the average height of the highest roof surface.
Height Limitations	Wood framed buildings shall be limited to three stories above *grade* or the limits given in applicable table.
Mezzanine	A *mezzanine* shall be considered a portion of the *story* in which it is contained. Such *mezzanines* shall not contribute to either the *building area* or number of *stories* as regulated by applicable code. The clear height above and below the *mezzanine* floor construction shall not be less than 7 feet. Area limitation. The aggregate area of a *mezzanine* or *mezzanines* within a room shall not exceed one-third of the floor area of that room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located. In determining the allowable *mezzanine* area, the area of the *mezzanine* shall not be included in the floor area of the room.

LEVEL		EGRESS	AREA
2nd and above		Sleeping rooms	5.7 sqft
1st		Sleeping rooms	5.0 sqft
Basement		If Over 200 sqft and not used only for mechanical equipment R310.1	5.7 sqft
		Window wells required if sill is lower than grade	9sqft and 36" wide
		Ladder or steps if well is lower than 44"	12" wide x 3" projection from wall & 18" o.c.

TABLE R602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS[a]

STUD SIZE (inches)	BEARING WALLS					NONBEARING WALLS	
	Laterally unsupported stud height[a] (feet)	Maximum spacing where supporting a roof-ceiling assembly or a habitable attic assembly, only (inches)	Maximum spacing where supporting one floor, plus a roof-ceiling assembly or a habitable attic assembly (inches)	Maximum spacing where supporting two floors, plus a roof-ceiling assembly or a habitable attic assembly (inches)	Maximum spacing where supporting one floor height[a] (inches)	Laterally unsupported stud height[a] (feet)	Maximum spacing (inches)
							
2 × 3[b]	—	—	—	—	—	10	16
2 × 4	10	24[c]	16[c]	—	24	14	24
3 × 4	10	24	24	16	24	14	24
2 × 5	10	24	24	—	24	16	24
2 × 6	10	24	24	16	24	20	24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

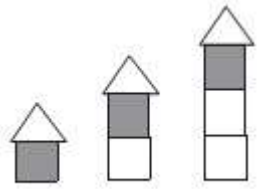
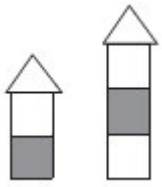
1. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Bearing walls shall be sheathed on not less than one side or bridging shall be installed not greater than 4 feet apart measured vertically from either end of the stud. Increases in unsupported height are permitted where in compliance with Exception 2 of Section R602.3.1 or designed in accordance with accepted engineering practice.

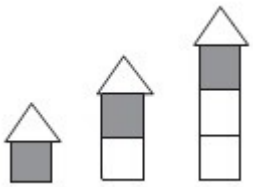
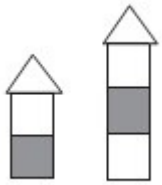
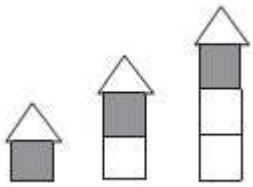
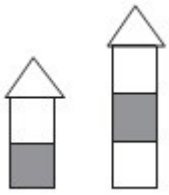
2. Shall not be used in exterior walls.

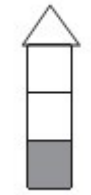
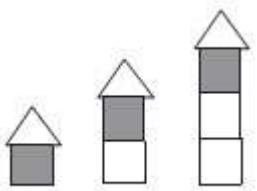
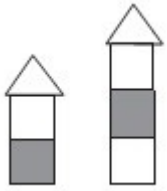
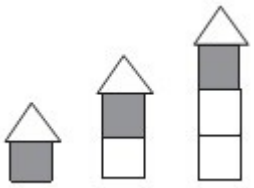
3. A habitable attic assembly supported by 2 × 4 studs is limited to a roof span of 32 feet. Where the roof span exceeds 32 feet, the wall studs shall be increased to 2 × 6 or the studs shall be designed in accordance with accepted engineering practice.

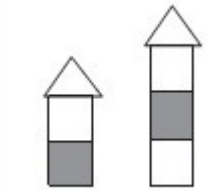
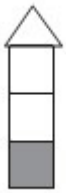
TABLE R602.10.3(1)

BRACING REQUIREMENTS BASED ON WIND SPEED

• EXPOSURE CATEGORY B • 30-FOOT MEAN ROOF HEIGHT • 10-FOOT WALL HEIGHT • 2 BRACED WALL LINES		MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE[a]				
Ultimate Design Wind Speed (mph)	**Story Location**	**Braced Wall Line Spacing[c] (feet)**	**Method LIB[b]**	**Method GB**	**Methods DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP, ABW, PFH, PFC, CS-SFB**	**Methods CS-WSP, CS-G, CS-PF**
≤ 110		10	3.5	3.5	2.0	1.5
		20	6.0	6.0	3.5	3.0
		30	8.5	8.5	5.0	4.5
		40	11.5	11.5	6.5	5.5
		50	14.0	14.0	8.0	7.0
		60	16.5	16.5	9.5	8.0
		10	6.5	6.5	3.5	3.0
		20	11.5	11.5	6.5	5.5
		30	16.5	16.5	9.5	8.0
		40	21.5	21.5	12.5	10.5
		50	26.5	26.5	15.5	13.0
		60	31.5	31.5	18.0	15.5
		10	NP	9.5	5.5	4.5
		20	NP	17.0	10.0	8.5
		30	NP	24.5	14.0	12.0
		40	NP	32.0	18.5	15.5
		50	NP	39.5	22.5	19.0
		60	NP	46.5	26.5	23.0
≤ 115		10	3.5	3.5	2.0	2.0
		20	6.5	6.5	3.5	3.5
		30	9.5	9.5	5.5	4.5

		40	12.5	12.5	7.0	6.0
		50	15.0	15.0	9.0	7.5
		60	18.0	18.0	10.5	9.0
		10	7.0	7.0	4.0	3.5
		20	12.5	12.5	7.5	6.5
		30	18.0	18.0	10.5	9.0
		40	23.5	23.5	13.5	11.5
		50	29.0	29.0	16.5	14.0
		60	34.5	34.5	20.0	17.0
		10	NP	10.0	6.0	5.0
		20	NP	18.5	11.0	9.0
		30	NP	27.0	15.5	13.0
		40	NP	35.0	20.0	17.0
		50	NP	43.0	24.5	21.0
		60	NP	51.0	29.0	25.0
≤ 120		10	4.0	4.0	2.5	2.0
		20	7.0	7.0	4.0	3.5
		30	10.5	10.5	6.0	5.0
		40	13.5	13.5	8.0	6.5
		50	16.5	16.5	9.5	8.0
		60	19.5	19.5	11.5	9.5
		10	7.5	7.5	4.5	3.5
		20	14.0	14.0	8.0	7.0
		30	20.0	20.0	11.5	9.5
		40	25.5	25.5	15.0	12.5
		50	31.5	31.5	18.0	15.5
		60	37.5	37.5	21.5	18.5
		10	NP	11.0	6.5	5.5
		20	NP	20.5	11.5	10.0
		30	NP	29.0	17.0	14.5

		40	NP	38.0	22.0	18.5
		50	NP	47.0	27.0	23.0
		60	NP	55.5	32.0	27.0
		10	4.5	4.5	2.5	2.5
		20	8.5	8.5	5.0	4.0
		30	12.0	12.0	7.0	6.0
		40	15.5	15.5	9.0	7.5
		50	19.5	19.5	11.0	9.5
		60	23.0	23.0	13.0	11.0
≤ 130		10	8.5	8.5	5.0	4.5
		20	16.0	16.0	9.5	8.0
		30	23.0	23.0	13.5	11.5
		40	30.0	30.0	17.5	15.0
		50	37.0	37.0	21.5	18.0
		60	44.0	44.0	25.0	21.5
		10	NP	13.0	7.5	6.5
		20	NP	24.0	13.5	11.5
		30	NP	34.5	19.5	17.0
		40	NP	44.5	25.5	22.0
		50	NP	55.0	31.5	26.5
		60	NP	65.0	37.5	31.5
		10	5.5	5.5	3.0	2.5
		20	10.0	10.0	5.5	5.0
		30	14.0	14.0	8.0	7.0
		40	18.0	18.0	10.5	9.0
< 140		50	22.5	22.5	13.0	11.0
		60	26.5	26.5	15.0	13.0
		10	10.0	10.0	6.0	5.0
		20	18.5	18.5	11.0	9.0

	30	27.0	27.0	15.5	13.0
	40	35.0	35.0	20.0	17.0
	50	43.0	43.0	24.5	21.0
	60	51.0	51.0	29.0	25.0
	10	NP	15.0	8.5	7.5
	20	NP	27.5	16.0	13.5
	30	NP	39.5	23.0	19.5
	40	NP	51.5	29.5	25.0
	50	NP	63.5	36.5	31.0
	60	NP	75.5	43.0	36.5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

NP = Not Permitted.

1. Linear interpolation shall be permitted.
2. Method LIB shall have gypsum board fastened to not less than one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.
3. Where three or more parallel braced wall lines are present and the distances between adjacent braced wall lines are different, the average dimension shall be permitted to be used for braced wall line spacing

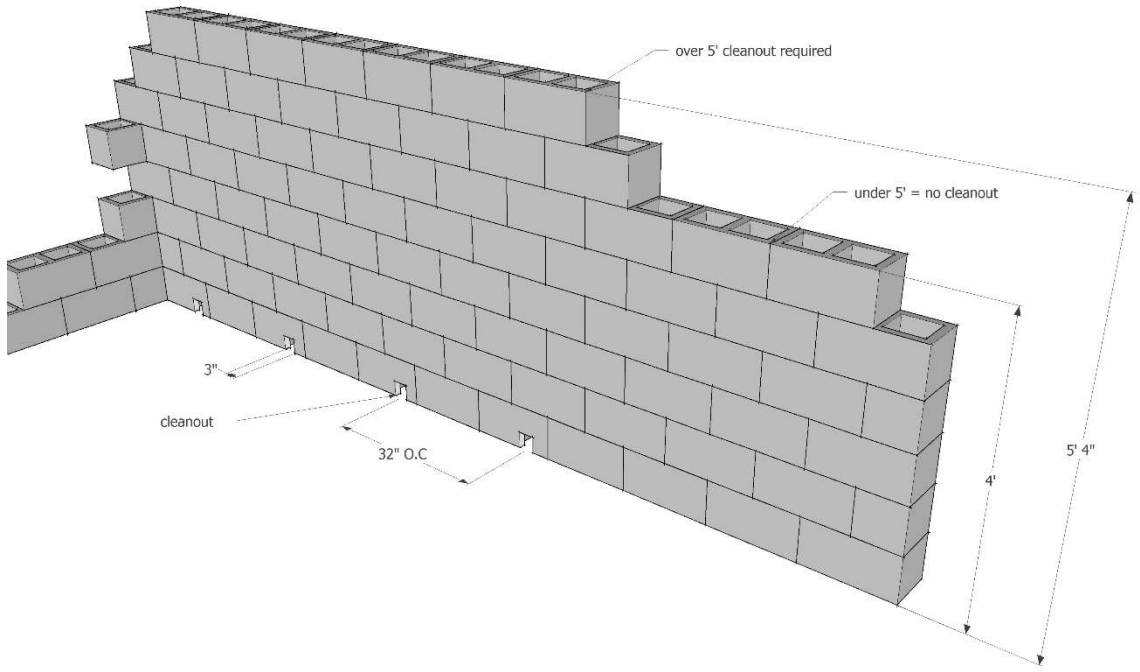
MASONRY STRUCTURES

BASED ON THE CALIFORNIA BUILDING CODE & ACI 530.1-05/ASCE 6-05/TMS 602-05

Prior to this inspection, all required sequential inspections and correction notices must be completed.

This is not an all-inclusive list and additional items may be required as determined during the inspection.

☐	Reinforcement is clean of mud, oil or other materials that could reduce bond 3.2A
☐	Prior to placing masonry all dust, aggregate and debris are removed. 3.2B
☐	Except for wet cutting do not wet concrete masonry before laying. 3.2C
☐	Grout spaces are free of mortar droppings, debris and loose aggregates. 3.2D
☐	All reinforcement is in place before grout placement 3.2E
☐	Cleanouts are provided for each grout pours over 5'high. Cleanouts are located @ 32" o.c and a minimum of 3sqin. Must be closed to prevent blowouts 3.2F
☐	Joints are treated with round jointer 3.3B.b
☐	Masonry protrusions over 1/2in or more into the cells to be grouted must be removed 3.3B.c
☐	Aluminum conduits, pipes or accessories are not allowed to be embedded in masonry 3.3E.7
☐	1/4in clearance for fine grout of 1/2in for course grout is maintained between steel and masonry. 3.4B.4
☐	Grout pours 12in or less may be consolidated by mechanical vibration or puddling 3.5E
☐	Grout pours over 12in may be consolidated by mechanical vibration and reconsolidated after initial water loss and settlement. 3.5E



Typ. Masonry wall

SPECIAL INSPECTIONS

If special Inspections are required for your project, the Special Inspector must provide the City of Oakland, Planning and Building Department with a final report (see reverse side sample report). In addition, the following conditions must be met:

1. Within ten (10) days of submitting the application, the contractor/owner must have the Special Inspector submit a letter to the City of Oakland, stating that (s)he will be the inspector of record and including the following information:
   - ✓ Name of job
   - ✓ Address of job
   - ✓ Property owner and address
   - ✓ Name and address of owner's agent (if applicable)
   - ✓ Special Inspector's name, address, and telephone number
   - ✓ Special Inspector's license number (if a California licensed Architect or California registered Civil or Structural Engineer)
   - ✓ Special Inspector's resume of qualifications (if other than a California licensed Architect or California registered Civil or Structural Engineer) to include education, training, employment and experience.
   - ✓ Special Inspector's statement of understanding and compliance with California Building Code

   Failure to provide this verification will result in the suspension of the permit(s)
2. **Projects MUST still have any and all foundation work, including piers, inspected by the Office of Planning and Building prior to the placement of concrete.**
3. The Special Inspector may not authorize concrete placement until the City of Oakland Building Inspector has approved the form work and signed permit card accordingly.
4. If the Special Inspector is relieved or discharged, (s)he and/or their employer must notify the Building Official immediately.

SAMPLE STATEMENT OF SPECIAL INSPECTIONS

To: City of Oakland

Building Official

Inspection Services

250 Frank H. Ogawa Plaza

Second Floor

Oakland, California 94612

Re: Project: _____

Project Address: _____

Building Permit # (s) _____ APN # _____

Date _____

Sir: This is to certify that in accordance with Section 1704 of the California Building Code, We have provided a special inspection of:

☐	01	Steel Construction	_____
☐	02	High strength bolting	_____
☐	03	Concrete Construction	_____
☐	04	Masonry Construction	_____
☐	05	Wind	_____
☐	06	Seismic Resistance	_____
☐	07	Soils	_____
☐	08	Foundation Systems	_____
☐	09	Sprayed Fire Resistant Materials	_____
☐	10	Mastic & Intumescent Fire-resist Coatings	_____
☐	11	Exterior insulation & finish system (EIFS)	_____

☐	12	Water- Resistive Barrier Coatings	
☐	13	Structural Observations	
☐	14	Smoke Control	
☐	15	C&D tracking	
☐	16	Fire Sprinkler	
☐	17	Tree Protection	
☐	18	Title 24 Energy- Hers Verification	
☐	19	Special Case/other:	

This inspection was performed by the undersigned Special Inspector (or by personnel under his/her supervision). To the best of our knowledge, the work was in conformance with the approved plans and specifications and the California Building Code.

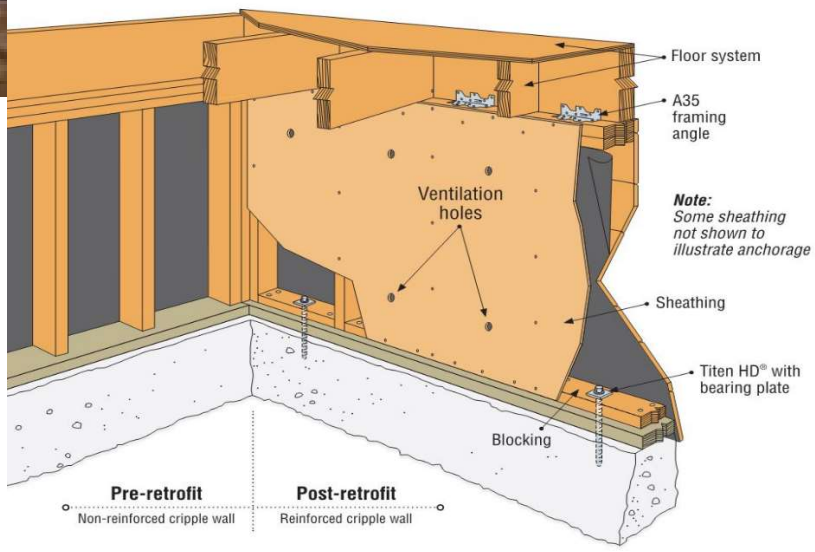
Sincerely,

Special Inspector

Stamp

VOLUNTARY SEISMIC STRENGTHENING FOR RESIDENTIAL BUILDINGS & STANDARD PLAN SET A

Plan Set A is a standard developed and approved by the Association of Bay Area Governments (ABAG) as a prescriptive method of seismic upgrade. Limited for use in buildings classified as Group R, Division 3 occupancy (SFD or Duplex) with/out an attached Group U, Division 1 occupancy (residential garage) of 5B type construction (wood frame) and no more than 2 stories high.



OMC Section 15.30.040 CHECKLIST

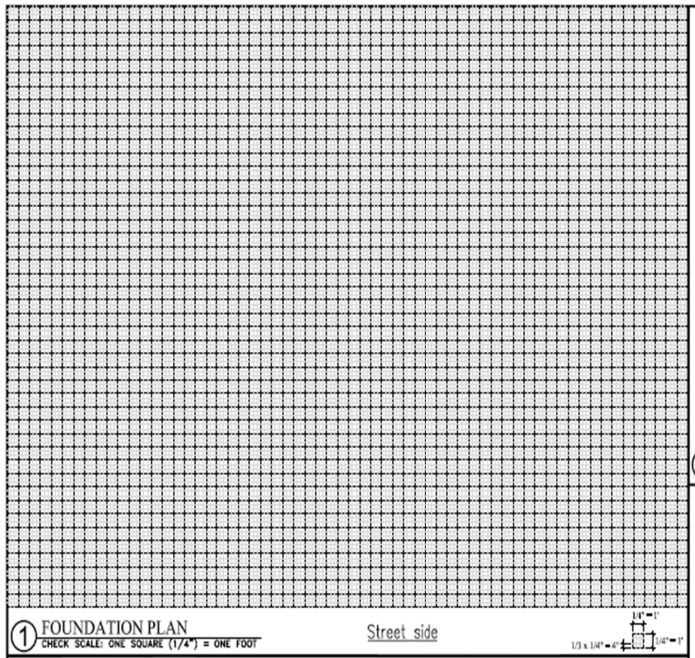
Oakland Municipal Code 15.30 contains all applicable adoptions, rules and regulation for the program. The following check list is used to either allow applicants to use the prescriptive methods outlined in Plan Set A or to disqualify certain buildings due to type or construction deficiencies from utilizing the prescriptive method. One should note that structural weaknesses uncovered during the inspection process are not disqualifying criteria under the program however, all weaknesses must be repaired under a separate permit and repairs are required as a condition of issuance of the strengthening permit.

OMC 15.30.040 CHECKLIST			
	A	Exclusions- Please answer ***YES*** OR ***NO*** to the following statements.	
This chapter shall apply solely to existing wood-framed, one- and two-story residential buildings classified either as Group R, Division 3 occupancy or as Group R, Division 3 with an attached Group U, Division 1 occupancy. The prescriptive design standards in this chapter shall not apply to buildings, or portions thereof, with any of the following elements or features.			
YES	**NO**		
☐	☐	1	Lateral force resistive system using or containing poles or columns embedded in the ground.
☐	☐	2	Cripple wall height exceeding four (4) feet, as measured vertically at any point.
☐	☐	3	Building exceeding two (2) stories in height or exceeding 3000 square feet of combined floor area for a two (2) story building or exceeding 2000 square feet of floor area for a one (1) story building, as defined in the Oakland Municipal Code.
☐	☐	4	Building erected on a slab-on-grade.
☐	☐	5	Building erected on or into sloping ground with a surface gradient steeper than 3-units horizontally to 1-unit vertically, as measured at any point.
☐	☐	6	Clay or concrete roof tiles with mortared edges.
☐	☐	7	Building frame other than wood.
☐	☐	8	Brick or stone veneer exceeding four (4) feet, as measured vertically at any point.
IF YOU ANSWERED ***YES*** TO ANY OF THE ABOVE STATEMENTS, CONSULT WITH A PROFESSIONAL ENGINEER			
OMC Section 15.30.200 Structural Weaknesses			
	A	Structural weaknesses include the following:	
☐	☐	1	Sill plates or floor framing supported directly on the ground without an approved foundation system.
☐	☐	2	Perimeter foundation constructed of wood posts supported by isolated footings.
☐	☐	3	Perimeter foundation that is not continuous.
		Exception: Existing porches, storage rooms, and similar spaces that do not contain fuel-burning appliances.	

☐	☐	4	Perimeter foundation constructed of un-reinforced concrete or assembled masonry (or with cracks and differential) settlement.
☐	☐	5	Sill plates not connected to the foundation in accordance with this chapter.
☐	☐	6	Cripple walls not braced in accordance with this chapter.
	B	A separate permit for strengthening structural weaknesses set forth in Sections 15.30.A.1 through A.4, inclusive, shall be required as a condition of issuance of a permit for strengthening structural weaknesses set forth in Sections 15.30.200.A.5 and A.6.	

PLAN SET A (As provided by ABAG)

[Residential Seismic Strengthening Plan- S1-Rev.1 Layout1 (1) (ca.gov)]



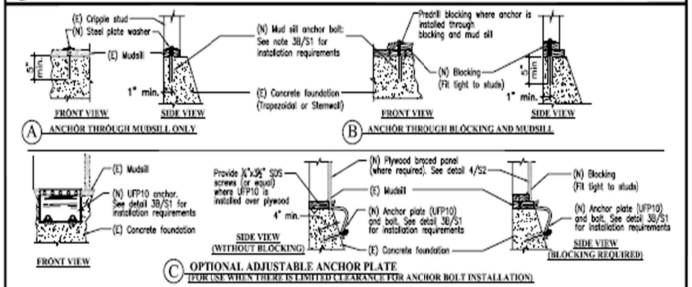
1 FOUNDATION PLAN

CHECK SCALE: ONE SQUARE (1/4") = ONE FOOT

1/4" = 1'

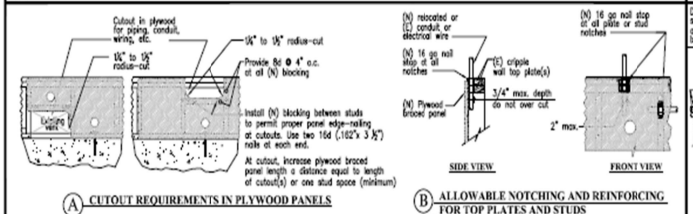
1/3 x 1/4" = 4"

1/4" = 1'



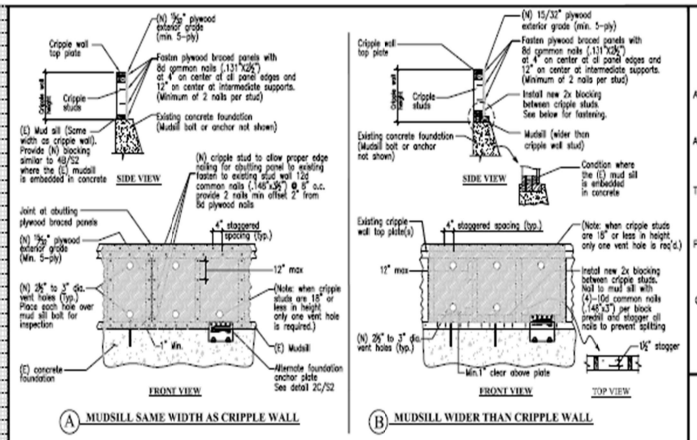
2 TYPICAL MUDSILL TO CONCRETE FOUNDATION CONNECTIONS

SCALE: NTS



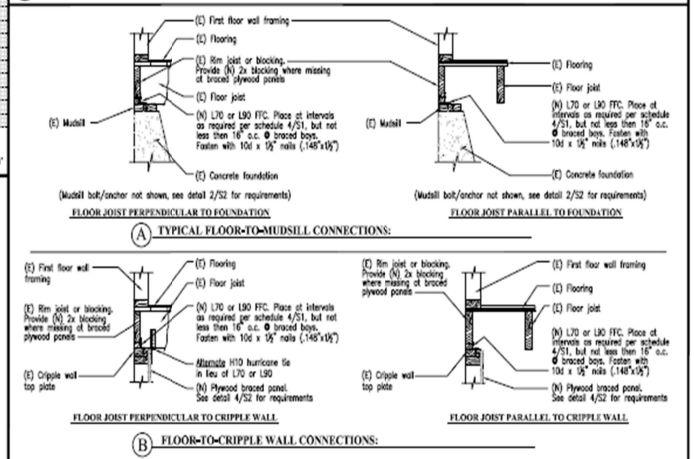
3 TYPICAL PANEL CUTOUTS & NOTCHING REQUIREMENTS

SCALE: NTS



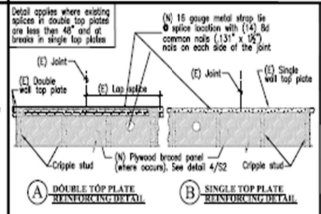
4 PLYWOOD BRACED PANEL INSTALLATION DETAIL

SCALE: NTS



5 TYPICAL FLOOR-TO-CRIPPLE WALL OR FLOOR-TO-MUDSILL CONNECTIONS

SCALE: NTS



6 TYPICAL TOP PLATE SPLICE DETAILS

SCALE: NTS

ACKNOWLEDGMENTS

This prescriptive plan set and the provisions for voluntary seismic retrofit of wood-frame homes were developed by a committee representing the East Bay and Peninsula chapters of the international code council (ICC). In addition, the plan development committee consisted of representatives from the following organizations who provided contributions and peer review:

A. Association of bay area governments (ABAG) earthquake program.
B. Building contractors specializing in home retrofitting.
C. California building officials (CALBO) emergency preparedness committee.
D. California building officials (CALBO) seismic safety committee.
E. Earthquake engineering research institute, Northern California chapter (EERI-NC)
F. ICC, TRI-chapter (East Bay, Peninsula, Monterey Bay) plan check standards committee.
G. Seismology & Structural standards, Light-Frame subcommittee, Existing building committe, Structural engineers association of Northern California (SEAONC)

APPLICANT INFORMATION

APPLICANT: _____

ADDRESS: _____

TELEPHONE: _____

PROPERTY ADDRESS: _____

OWNER: _____

APPLICANT'S SIGNATURE

STANDARD PLAN A (2008)
RESIDENTIAL SEISMIC STRENGTHENING PLAN

PRESCRIPTIVE SEISMIC STRENGTHENING PLAN FOR CRIPPLE WALL BRACING AND FOUNDATION SILL PLATE ANCHORAGE OF LIGHT WOOD FRAMED RESIDENTIAL STRUCTURES.

S2

2 OF 2

VOLUNTARY SEISMIC STREGTHENING INSPECTION CHECKLIST		
Based on the ABAG 2008 version of the Standard Plan Set A		
Anchor bolt holes 5” min depth, clean and dry before epoxy		
Mechanical anchor specimen on site		
Simpson UPF10 holes clean and dry before epoxy. All connectors on site		
Mudsill blocking: 4 –10d common (.148”) nails only –do not split wood.		
3”x3”x1/4” plate washers for all new ½” and 5/8” anchor bolts. (2”x2”x3/16” plate washers may be allowed where installation of 3”x3”x1/4” plate washers are determined to be impracticable by the Building Inspector)		
Anchor bolt nut and washer installed over blocking.		
Contact with pressure treated wood: use hot-dipped nails and G185 sheet (‘Z-Max’) connectors minimum.		
If no continuous rim joist, end joist or solid blocking above perimeter cripple walls or mudsill: New blocking and or supplemental connectors shall be provided (to connect top of braced wall panel or mudsill to construction above).		
Panel cutouts for piping, conduit, wiring, vents, etc. must be blocked and edge-nailed and 1-1/4” to 1-1/2” radius cut provided at inside corners of panel cutouts. (Exception: holes up to 3” diameter)		
At cutouts increase plywood panel length a distance equal to length of cutout(s) or one stud space minimum.		
Joints at abutting shear panels: Install new cripple stud nailed to existing with 16d common nails (3-1/2” x .162”) @ 8”o.c. (3 nails minimum) to allow proper edge-nailing for abutting panels.		
Aspect ratio: Panel length minimum 48” and twice the height.		
Panel type: 5-ply plywood 15/32” (1/2”) CDX only.		

Panel nailing: 8d common (.131”) nails at minimum 3-1/2”o.c. and maximum 4”o.c. for edges and 12”o.c. at intermediate supports. Do not overdrive nails - maximum 1/32” from panel face to top of nail head or 1 ply broken by bottom of nail head.		
If splices in top plates do not have a minimum 48” lap, provide 16 GA. X 4’ metal strap placed over the plywood with 28 –8d common nails.		
Notches in top plates maximum 2” long x ¾” deep must have 16 GA. nail stop - larger notches are considered splices (see #12).		
L70’s and L90’s: use 10d common (.148”) x 1-1/2” nails.		

Chapter 4 FRAMING

Framing occurs before any building paper; roof underlayment; or rough plumbing, mechanical or electrical is installed. This allows the building inspector to inspect required shear walls/braced walls, roof nailing, exterior strapping, anchoring hardware (IE; Hold-downs, bolts, joist hangers, etc) before the structural items can be covered with the weatherproofing of the house. Roof and Shear inspections can be an elaborate process as it is dependent on the size of the home, the engineered design, and number of stories. Typically, a Special Inspection is required either as prescribed by the design engineer or Chapter 17 of the California Building Code. The Special Inspection field report must take place before a City of Oakland inspection and the report must be provided to the Inspector for verification. A Special Inspection is not in lieu of required City of Oakland inspection. Upon Completion of this stage projects typically move towards the ROUGH stage, which many times is called FRAME as well.

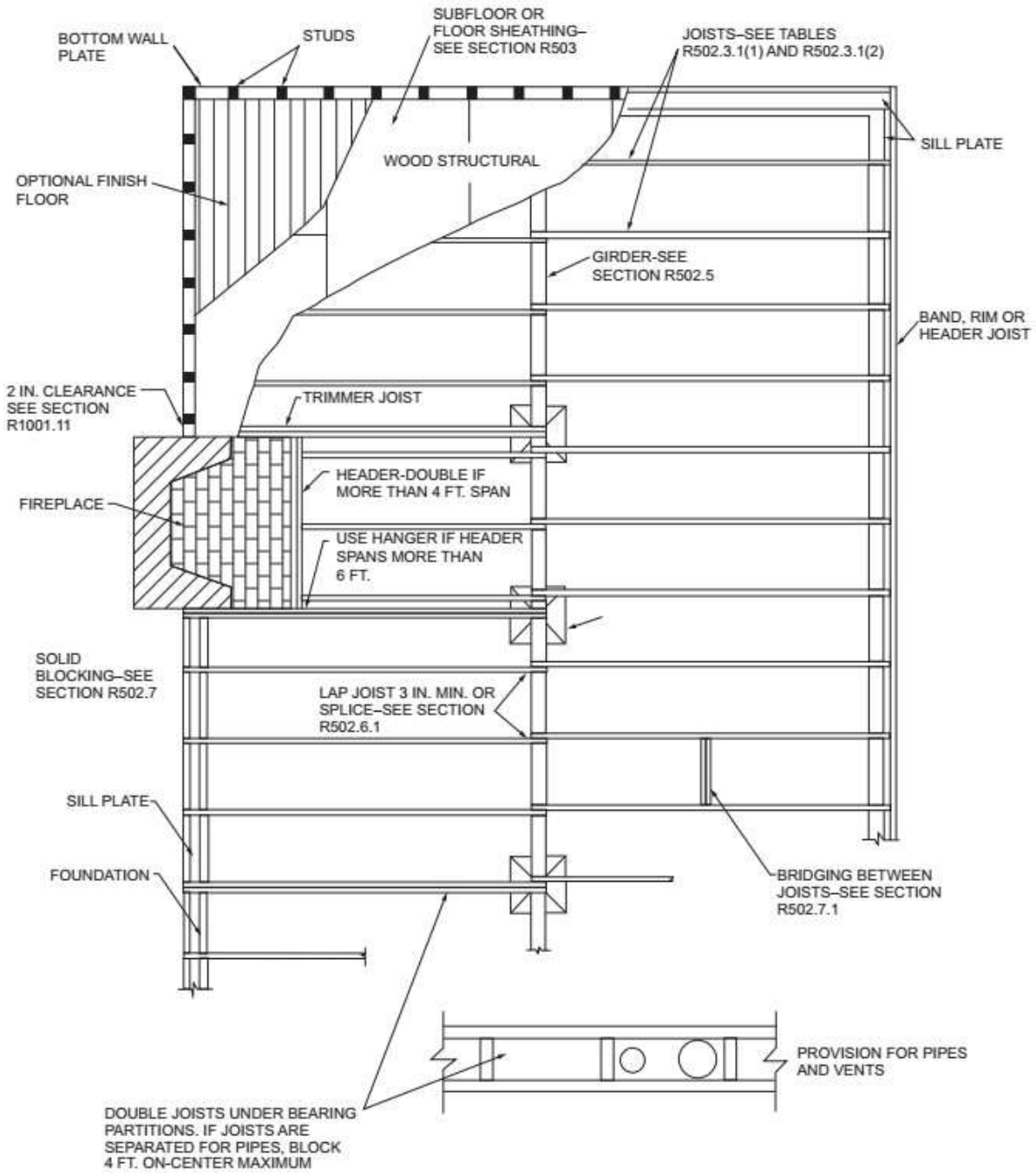
UNDERFLOOR INSPECTION

UNDERFLOOR INSPECTION CHECKLIST		
Prior to this inspection, all required sequential inspections and correction notices must be completed. This is not an all-inclusive list and additional items may be required as determined during the inspection.		
Address to be posted, visible from road. OMC 15.40.010		
Toilet facilities on-site with secondary containment are mandatory. OMC15.04.1.170		
Construction site is safe for inspection. Boards with nails and excessive debris removed. Ladders and scaffold properly secured.		
Best Management Practices (BMP) are in place for storm-water control. OMC13.16.100 and Dust Control OMC15.36.100		
Approved set of construction documents and permit card are on the job-site.		
Engineer's structural observation report is on-site, if applicable. Refer to construction documents. CRC R109.1.5.2		
All fasteners (ie; Nails, anchor bolts and washers) in contact with preservative-treated wood shall be hot dipped galvanized CRC R317.3.1"		
Top of foundation stem wall at min 6" from exposed earth CRC R404.1.6 and Wood siding, sheating and wall framing is at least 6" from exposed earth CRC R317.1(5).		
Joists and girders are installed per the approved plans. CRC R502		
Joists have at least 18" clearance to exposed ground and girders have at least 12" clearance. CRC R317.1(1)		
Use joist hangers at ends of unsupported joist, beam or girders with min. 1-1/2" bearing including openings CRC R502.6 & R502.10		
Untreaded wood columns on crawl spaces shall be >8" above exposed earth CRC R317.1.4(2)".		
A positive connection (post cap or gusset) between the post and girder is provided. CRC R502.9		
Sill plates are preservative-treated wood and the size specified on the approved plans.		

Anchor bolts are installed per the approved plans. Retrofit anchor bolts are installed where needed. An anchor bolt (or retrofit bolt) is installed between 4” and 12” from plates ends.		
3”x3” (x1/4" galvanized)square washers are installed with anchor bolts.		
Hold-down bolts are extended through floor framing as per manufacturer recommendations CRC R502.2.1		
Vertical loads are blocked through floor (as per CRC R602.10.8) or when required by Engineer.		
I joist; blocking, web stiffeners, crush blocks, hangers, cutting, and notching, etc. per manufacturer. CRC R502.1.2(ASTM D5055)		
Shear walls are no less that 9-1/2" overlap" below floor framing. FIGURE R602.10.6.4		
All metal hardware specified on the approved plans is installed as per manufacturer's specifications		
Joists are nailed to beams and plates.		
Rim joists are toe-nailed to plates.		
exterior deck construction, attachment and vertical/lateral provisions shall be in place. CRC R507		
Under-floor ventilation is provided. Insulation baffles are installed as needed. CRC408.2		
An 18”x24” under-floor access is provided. CRC §R408.4 Waste and water piping systems completed and on test.		
Plumbing cleanouts are extended to outside the building, above the floor or within 20’ of an under-floor access.		
Gas pipe installed and tested, CALCULATIONS. Note: Test inspected once drywall is installed.		
All piping systems are adequately supported		
Ducting is installed:		
-Supported every 4’ with 1½” straps.		
-Has 4” clearance to ground.		
-Allows for 18” under-floor access throughout.		
-Radius of bends do not exceed the duct diameter. Per duct manufacturer specs.		
HVAC registers are blocked on all sides.		
HVAC registers are insulated.		
HVAC registers and ducts sealed from construction dust.		
Under-floor furnace, if applicable:		
-Is suspended or mounted above exposed ground.		
-Has 30”x30” access and passageway, within 20’.		
-A switched light and GFCI receptacle are provided.		
-Has 30” high unobstructed passage from access to equipment		
Non-metallic sheathed electrical cable is **protected** (covered) if installed less than 3’ above grade (crawl space) or **concealed**		

(within the building framing) in areas up to 8’ from grade (basement /storage). OMC 15.04.740		
Floor insulation R-value matches the CF-1R form shall be verified prior to floor sheathing. (SEPARATE INSPECTION):		
-HERS verification for quality insulation installation required		
-HERS verification for sealed ducts required		

FLOOR FRAMING



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
FIGURE R502.2
FLOOR CONSTRUCTION

NOTCHING and BORING

Prior to this inspection, all required sequential inspections and correction notices must be completed.
This is not an all-inclusive list and additional items may be required as determined during the inspection.

The Residential Building Code has multiple limitations on the amount of material that may be removed or cut away from any framing member. Whether you are installing pipes, conduits, wires or any other items within a wall frame, the size of the penetrations must always be taken into consideration. The limitations presented in the table below apply to prescriptive construction methods including Lateral Braced Panels (LBP's). Shear wall construction (engineered walls) is not a subject included in this topic. When planning a project, one should always keep in mind the areas when piping will be installed (bathrooms, kitchens and laundry areas) and consider the use of a "Plumbing Wall", this walls are either over built (such as increasing a required 2x4 wall for a 2x6), or furring walls (increasing the thickness of a wall to conceal piping without cutting into the supporting wall. Building an exterior or interior load bearing 2x4 stud wall limits the installation of pipes within the wall cavity to 2.1inch, this is only sufficient to install a nominal 1-1/2" abs pipe since a 2 inch nominal is 2.380 inch. Hence, the installation of a kitchen sink (2" drain required) or a laundry stand (2"drain required) become difficult without the use of Stud Shoes (fig D). These hardware reinforcements allowed by code may be used to "repair" over drilled studs but the installation requires holes to be precisely drilled which may be difficult when dealing with existing walls and are limited for use over 2inch nominal pipes.

DRILLING AND NOTCHING LIMITATIONS

R602.6	Stud Size	Non bearing -interior	Load Bearing -exterior	Repair
DRILLING		60% max- 5/8in to edge	+40% - 60% (doubled)	
	2x4	2 -1/16 in	1-3/8 in - 2-1/16 in	HSS2-SDS up to 3 studs
	2x6	3-3/8 in	2-1/4 in - 3-3/8 in	NONE
NOTCHING		40% max	25% max	
	2x4	1-3/8 in	7/8 in	NONE
	2x6	2-1/4 in	1-3/8 in	NONE
drawing		Figure A	Figure B	
R602.6.1	Top Plate		50% maximum	
Drilling, cut or notch	2x4		1-3/4 in	16ga x 1-1/2" galvanized. Strap each side of opening or structural Ply.
	2x6		2-3/4 in	
drawing			Figure C	Figure D

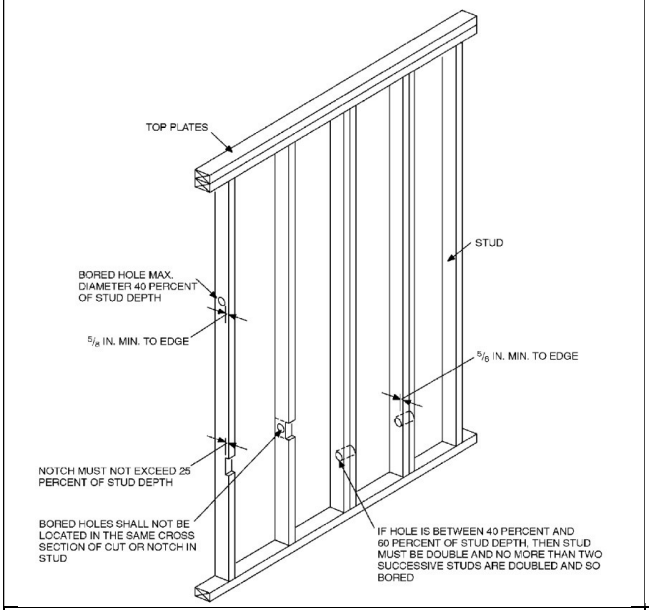


Figure 602.6(1) Notching and Bored Hole Limitations for Exterior walls and Load Bearing walls

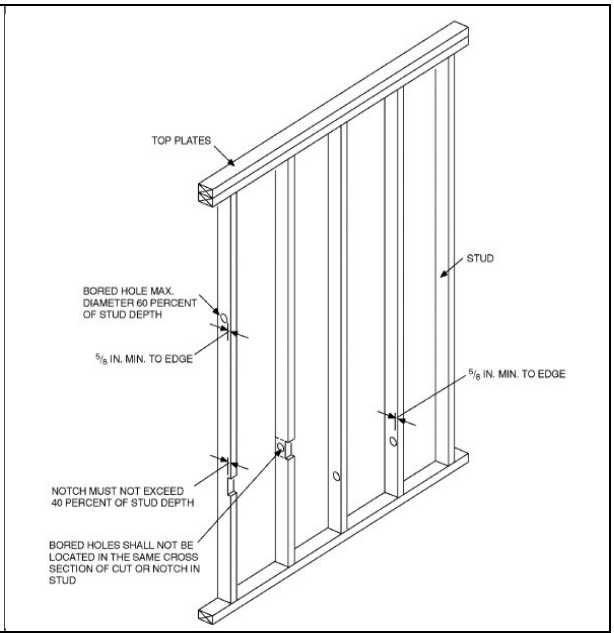


FIGURE R602.6(2) NOTCHING AND BORED HOLE LIMITATIONS FOR INTERIOR NONBEARING WALLS

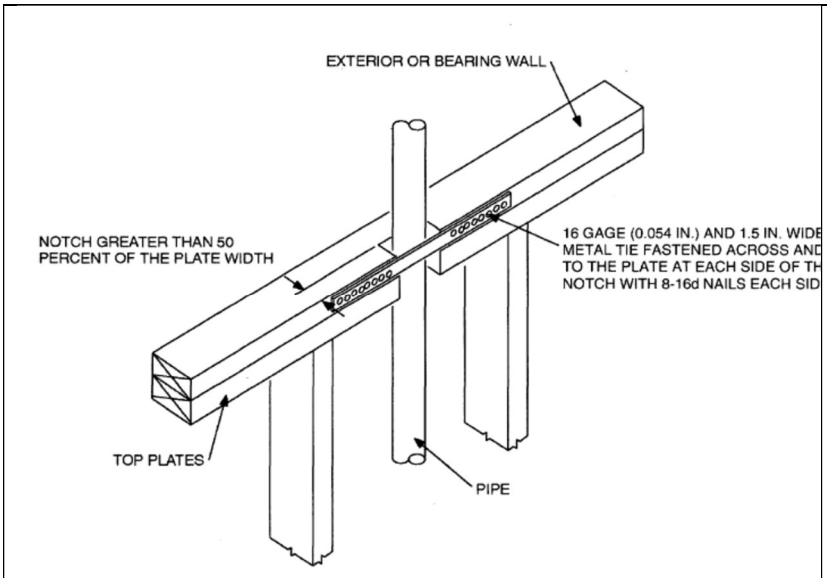


FIGURE 602.6.1 TOP PLATE FRAMING TO ACCOMMODATE PIPING

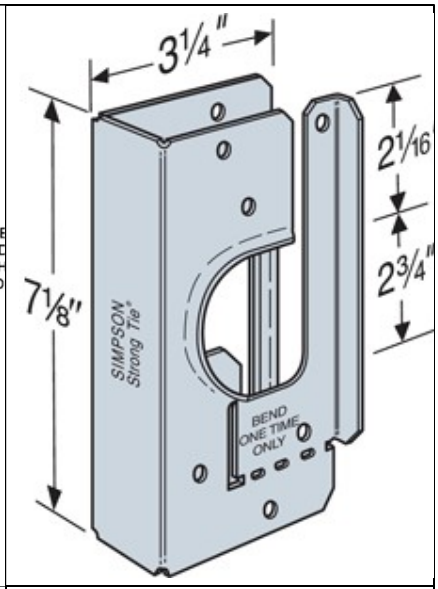
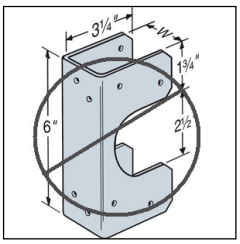


Figure D

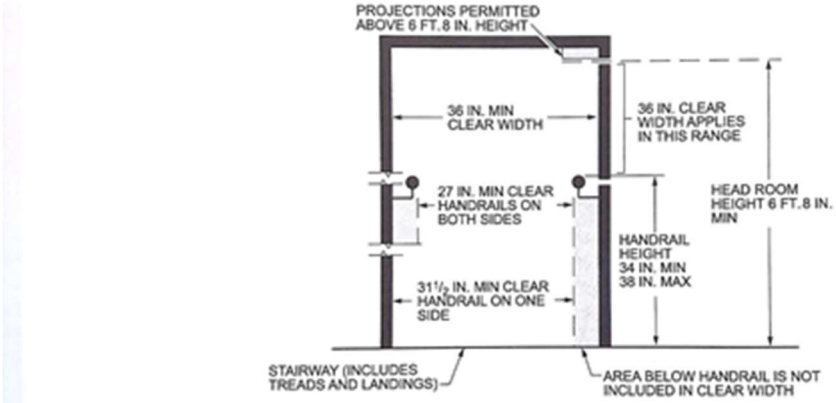


S shoe for nail protection only.

STAIR REQUIREMENTS

RESIDENTIAL STAIRS
CRC Section R311

R311.7.1 Width. Stairways shall not be less than 36" (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5" (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31½" (787 mm) where a handrail is installed on one side and 27" (698 mm) where handrails are provided on both sides.

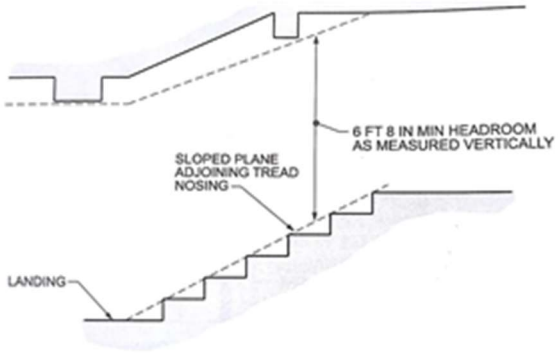


For SI: 1inch = 25.4 mm, 1 foot = 304.8 mm.

Figure R311.7.1
STAIRWAY CLEARANCES

Exception: The width of spiral stairways shall be in accordance with Section R311.7.10.1.

R311.7.2 Headroom. The minimum headroom in all parts of the stairway shall not be less than 6' 8" (2032 mm) measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

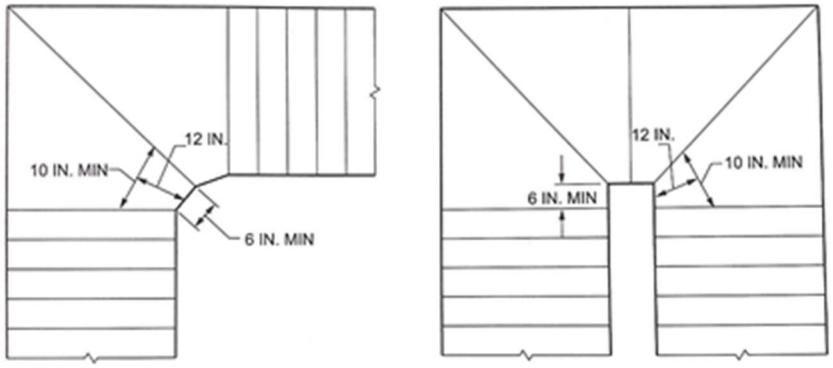
Figure R311.7.2(1)
MINIMUM HEADROOM

Exception 1: Where the nosings of treads at the side of a flight extend under the edge of a floor opening through which the stair passes, the floor opening shall be allowed to project horizontally into the required headroom a maximum of 4¾" (121 mm).

Exception 2: The headroom for spiral stairways shall be in accordance with Section R311.7.10.1.

R311.7.3. Vertical rise. A flight of stairs shall not have a vertical rise larger the 151" (12’7”) between floor levels or landings.

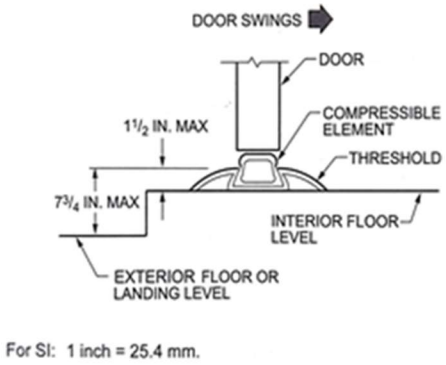
R311.7.4 Walkline. The walkline across winder treads shall be concentric to the curved direction of travel through the turn and located 12" (305 mm) from the side where the winders are narrower. The 12" (305 mm) dimension shall be measured from the widest point of the clear stair width at the walking surface of the winder. If winders are adjacent within the flight, the point of the widest clear stair width of the adjacent winders shall be used.



For SI: 1 inch = 25.4 mm.

Figure R311.7.5.2.1(1)
WINDERS

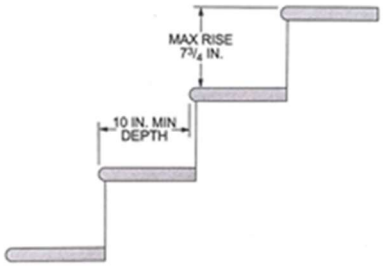
R311.7.5 Stair treads and risers. Stair treads and risers shall meet the requirements of this section. For the purposes of this section all dimensions and dimensioned surfaces shall be exclusive of carpets, rugs or runners.



For SI: 1 inch = 25.4 mm.

For SI: 1 inch = 25.4 mm.

Figure R311.7.5.1(2)
STAIR TOLERANCES



For SI: 1 inch = 25.4 mm.

Figure R311.7.5.1(1)
CONVENTIONAL STAIRWAY

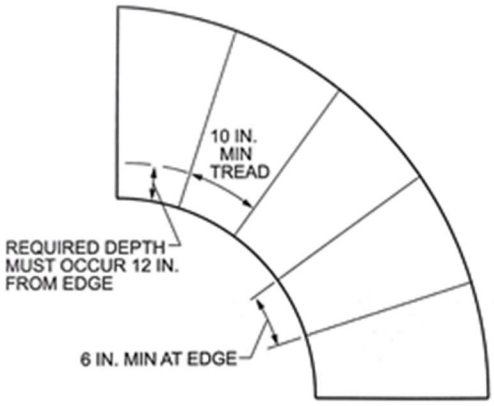
R311.7.5.1 Risers. The maximum riser height shall be 7 3/4" (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8" (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the openings located more than 30" (762mm), as measured vertically, to the floor or grade below do not permit the passage of a 4" diameter (102mm) sphere.

Exception 1: The opening between adjacent treads is not limited on spiral stairways.

Exception 2: The riser height of spiral stairways shall be in accordance with Section 311.7.10.1.

R311.7.5.2. Treads. The tread depth shall be not less than 10" (254mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8" (9.5mm).

R311.7.5.2.1. Winder treads. Winder treads shall have a tread depth of not less than 10" (254mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a tread depth of not less than 6" (152mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than
3/8" (9.5mm). Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8" (9.5mm) of the rectangular tread depth.



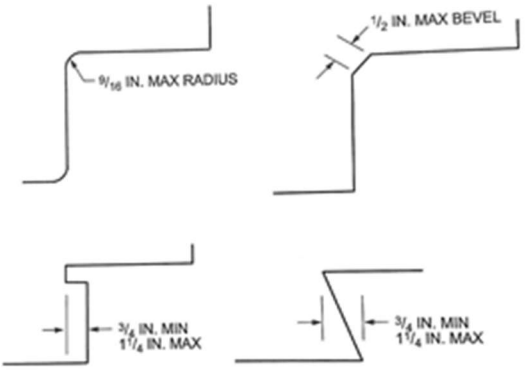
For SI: 1 inch = 25.4 mm.

Figure R311.7.5.2.1(2)
WINDERS USED FOR CIRCULAR STAIRWAY

Exception: The tread depth at spiral stairways shall be in accordance with Section R311.7.10.1.

R311.7.5.3. Nosings. The radius of curvature at the nosing shall be not greater than 9/16" (14mm), or a bevel not greater than 1/2" (12.7mm). A nosing projection not less than ¾" (19mm) and not more than 1-1/4" (32mm) shall be provided on stairways. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8" (9.5mm) within a stairway.

Exception: A nosing projection is not required where the tread depth is not less than 11" (279mm).



For SI: 1 inch = 25.4 mm, 1 degree = 0.01749 rad.

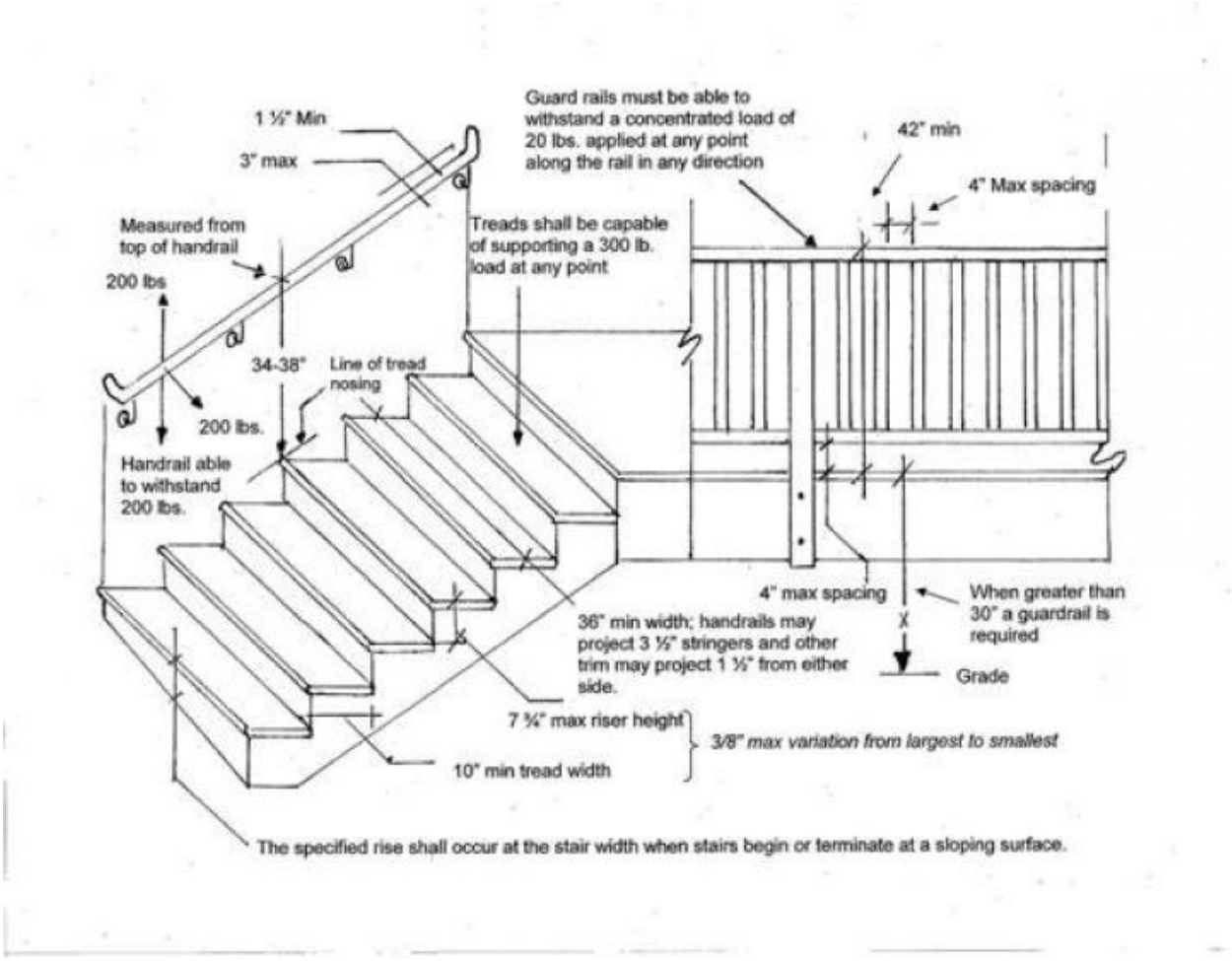
Figure R311.7.5.3
NOSINGS

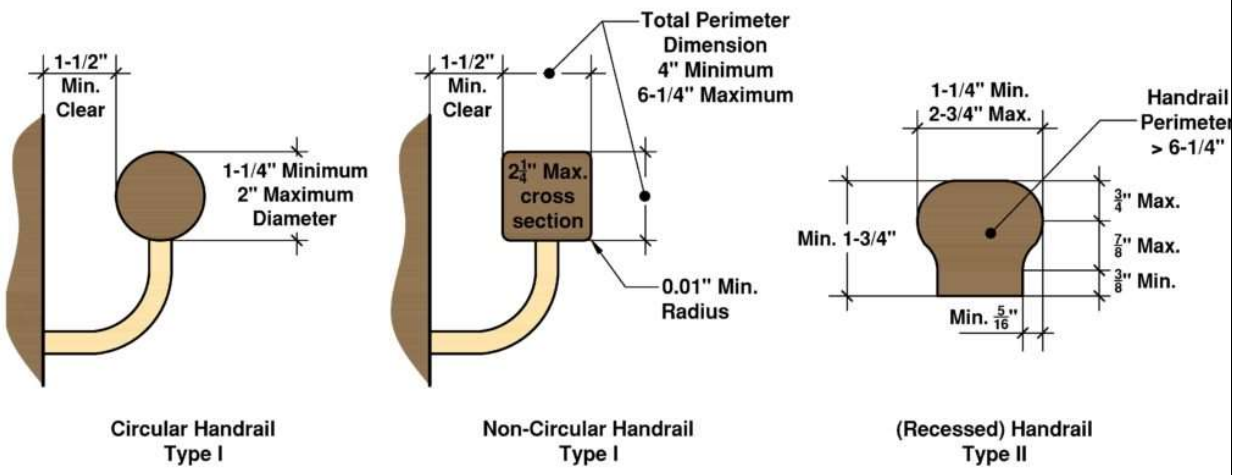
R311.7.5.4. Exterior plastic composite stairs treads. Plastic composite exterior stair treads shall comply with the provisions of this section and Section R507.2.2. ASTM D7032

R311.7.6 Landings for stairways. There shall be a floor or landing at the top and bottom of each stairway. The width perpendicular to the direction of travel shall be not less than the width of the flight served. Landings of shapes other than square or rectangular shall be permitted provided that the depth at the walk line and the total area is not less than that

of a quarter circle with a radius equal to the required landing width. Where the stairway has a straight run, the depth in the direction of travel shall be not less than 36" (914 mm).
Exception: A floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided that a door does not swing over the stairs.

R311.7.7 Stairway walking surface. The walking surface of treads and landings of stairways shall be sloped no steeper than one unit vertical in 48" horizontal (2-percent slope).

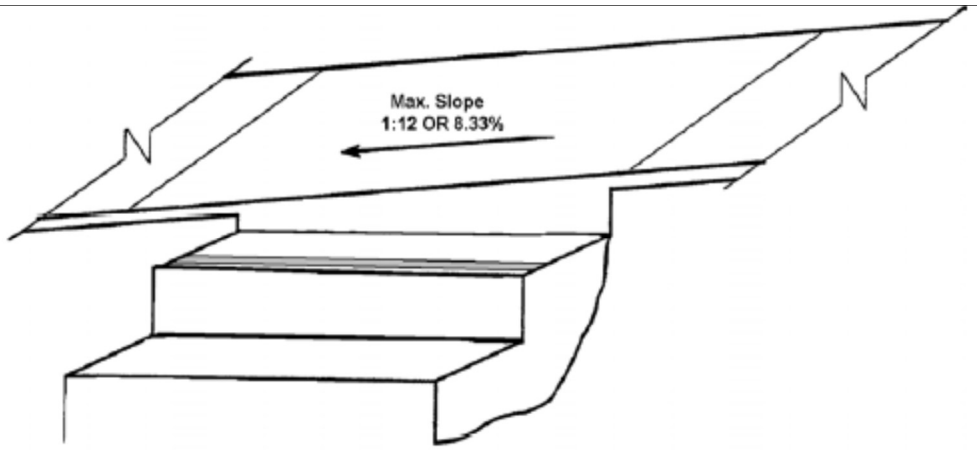




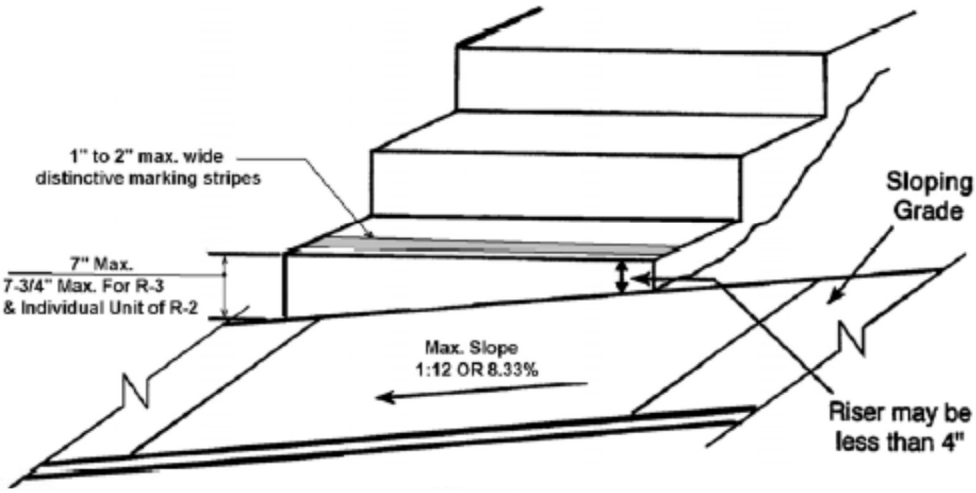
ACCEPTABLE HANDRAIL CONSTRUCTION

Applicable to single family and individual units in R-2

RISERS ADJOINING A SLOPING PUBLIC RIGHT OF WAY



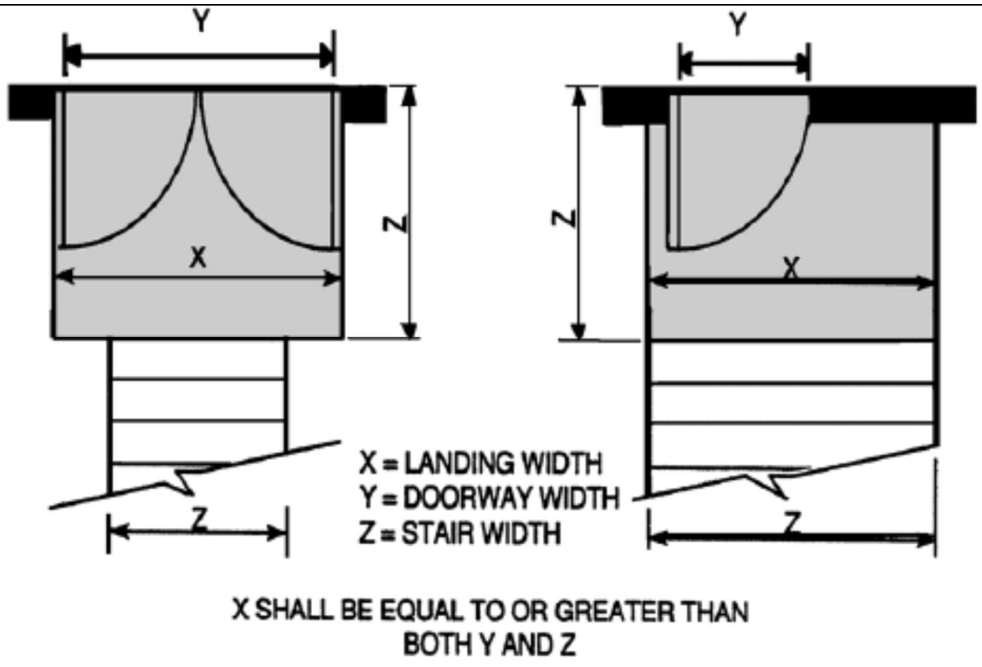
TOP



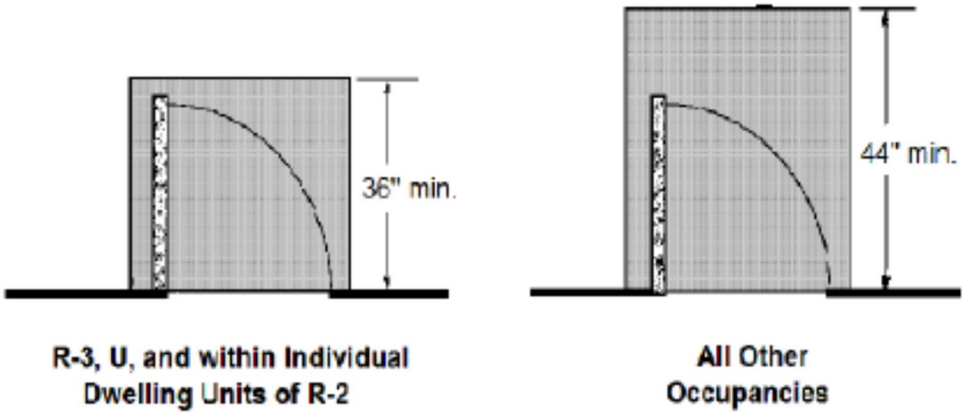
BOTTOM

STAIRWAYS AND DOOR LANDINGS

STAIRWAYS AND DOOR LANDINGS

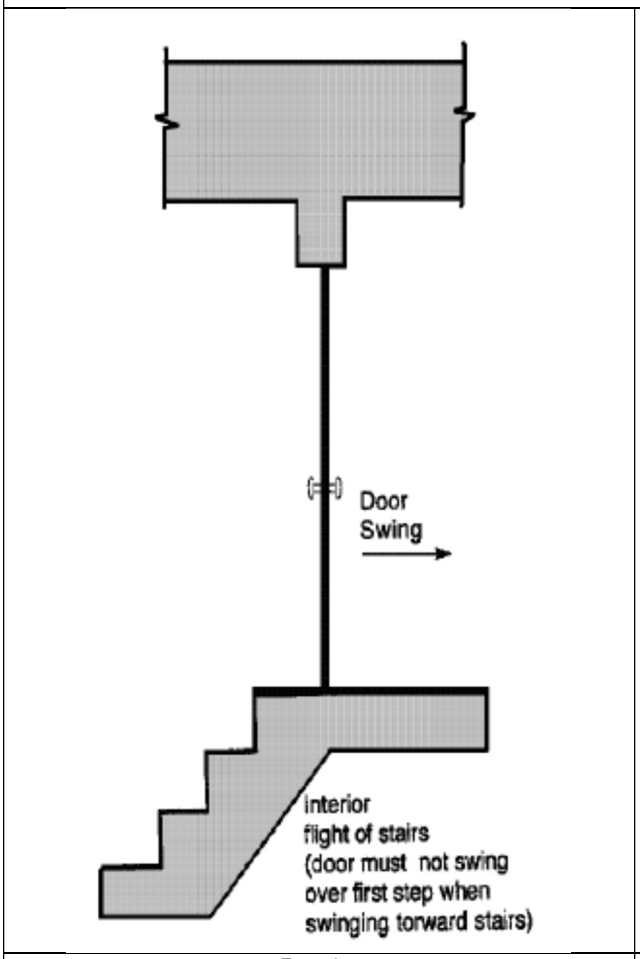
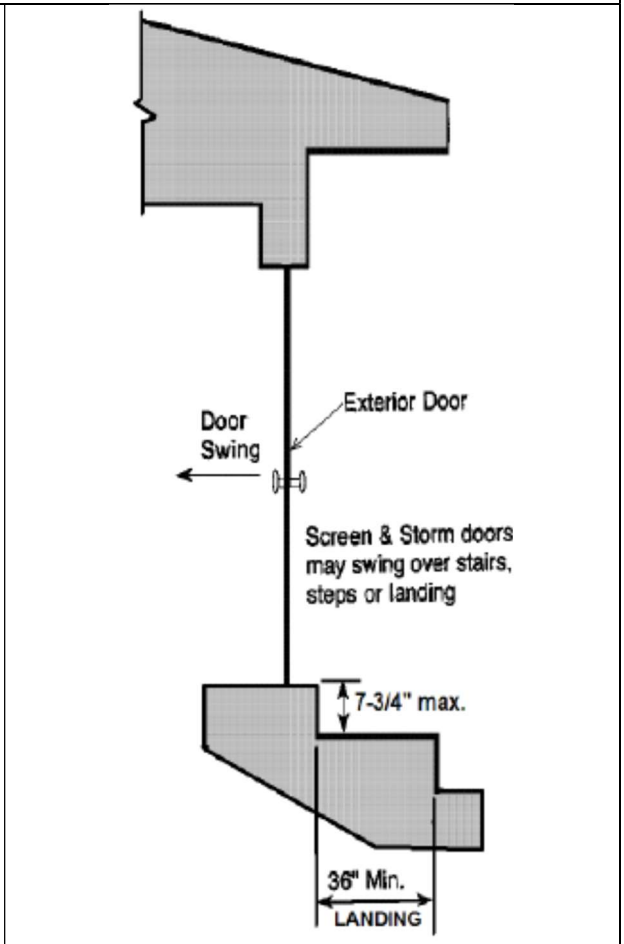


STAIRWAY LANDINGS

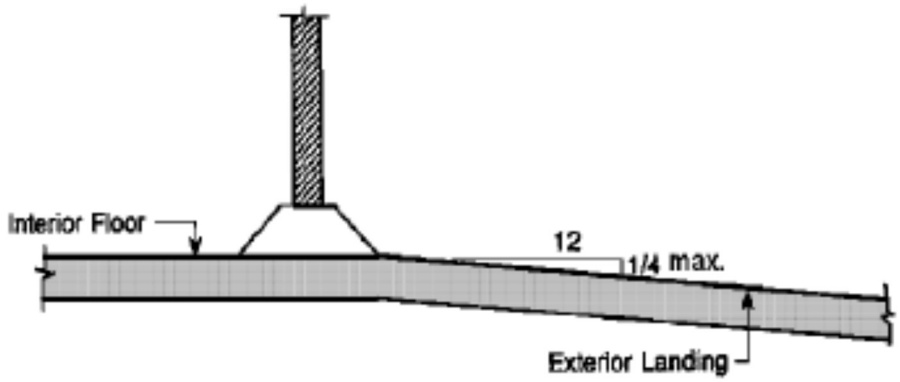


LANDINGS AT DOORS

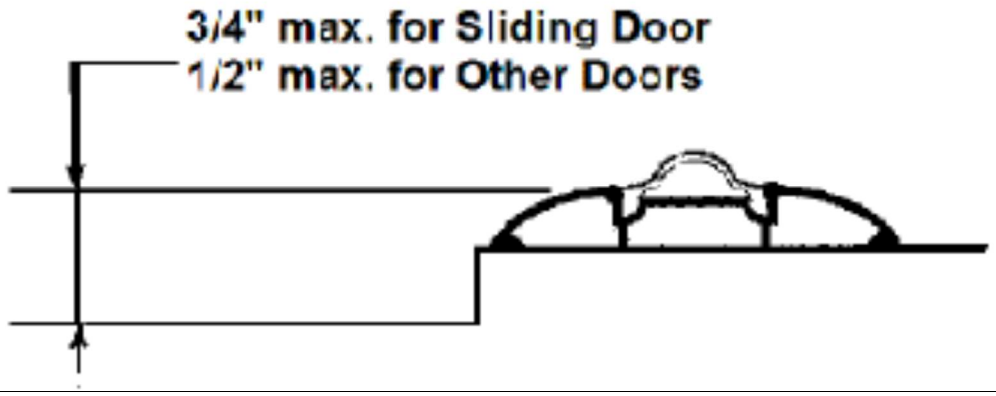
FLOOR LEVELS AT DOORS

<table>
<tr><th colspan="2">FLOOR LEVELS AT DOORS</th></tr>
<tr><td colspan="2"></td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Exception</td><td></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>1</td><td>Exceptions regarding landings and floor are applicable in group R-3 and individual units of group R-2</td></tr>
<tr><td>2</td><td>A landing is not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway per 2010 CRC exp. R311.2</td></tr>
</table>

FLOOR LEVEL AT DOORS AND THRESHOLD HEIGHT



FLOOR LEVEL AT DOORS



TRESHOLD HEIGHT

OMC15.04.3.10.105 CEBC Section 403.1

In Section 403.1 of the California Building Code, replace this exception 1 in its entirety with the following: "Where the partial repair of a stairway, guardrail, or handrail does not exceed 33% of the existing section of repaired elements, and the existing section is in accordance with the code that was current at the time of original construction, and the existing section does not continue or exacerbate an unsafe condition, then the repair may match the existing construction. Repairs to existing stairways with masonry or concrete surfacing exceeding four inches in thickness and supported by wood framing may conform with the provisions of this section. If the repair of the wood framing does not exceed 33% of the existing wood frame section being repaired, and the masonry or concrete surfacing is in sound condition with nothing more than shrinkage cracks, and the rise and run of the stairway are in accordance with the code that was current at the time of original construction, and the stairway has positive drainage and has not settled excessively towards or away from the building; and the existing section does not continue or exacerbate an existing condition, the repair may match the existing construction. All replacement of the wood framing supporting the masonry or concrete surfacing shall be factory pressure preservative treated. All replacement wood framing within six inches of the ground shall be pressure preservative treated approved for direct ground contact. All end field cuts of pressure preservative treated wood shall be properly treated with preservative."

This is not an all-inclusive list and additional items may be required as determined during the inspection

DECK CONSTRUCTION CHECKLIST		
☐	1	Address to be posted, visible from road.
☐	2	
☐	3	Construction site is safe for inspection. Boards with nails and excessive debris removed. Ladders and scaffold properly secured
☐	4	
☐	5	Approved plans and permit card are on the job-site.
☐	6	Engineer's structural observation report is on-site, if applicable. Refer to plans. CRC R109.1.5.2 and CBC1710
☐	8	Naturally durable wood or wood that is preservative-treated used for structural members supporting moisture-permeable floors or roofs that are exposed to the weather. CRC R317.1(6)
☐	9	Framing members sized and installed per plan. CRC R502
☐	10	Field-cut ends, notches and drilled holes of preservative-treated wood shall be treated in the field in accordance with AWPA M4. R
☐	11	Decks supported by attachment to an exterior wall, are positively anchored to the primary structure. (no nailing allowed). CRC R507.8
☐	12	Deck ledger of pressure preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir or *approved* decay- resistant species, and a 2-inch nominal lumber band joist bearing on a sill plate or wall plate is connected with 1/2-inch lag screws or bolts with washers in accordance with R507.9.3(1) Code CRC R507.9 TABLE

TABLE R502.2.2.1
FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER & A 2" NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST [c,f,g]
(Deck live load = 40 psf, deck dead load = 10 psf)

JOIST SPAN	6' and less	6'1"to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16' 1" to 18'
Connection details	**On-center spacing of fasteners [d,e]**						
1/2 inch diameter lag screw with 15/32 inch maximum sheathing [a]	30	23	18	15	13	11	10
1/2 inch diameter bolt with 15/32 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 15/32 inch maximum sheathing and 1/2 inch stacked washers [b,h]	36	36	29	24	21	18	16

a	The tip of the lag screw shall fully extend beyond the inside face of the band joist. Table R507.9.3(1)(c) CRC R507.9.1.3
b	The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2".
c	Ledgers shall be flashed to prevent water from contacting the house band joist.
d	Lag screws and bolts shall be staggered in accordance with Section R502.2.2.1.1.
e	Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No.2 grade lumber, or other approved materials as established by standard engineering practice.
f	When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum I inch thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural

			panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.
		g	A minimum 1 x 9-1/2 inch Douglas-Fir laminated veneer lumber rim-board shall be permitted in lieu of the 2-inch nominal band joist.
		h	Wood structural panel sheathing, gypsum board sheathing or foam sheathing not exceeding 1 inch in thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch .
			Table R502.2.2.1
☐	13	Deck ledger connections not conforming to Table R502.2.2.1 shall be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer. R502.2.2.2	
☐	14	Lag screws, bolts and washers are hot -dipped galvanized or stainless steel. CRC R 507.9.1.3	
☐	15	Lag screws or bolts are placed 2 inches in from the bottom or top of the deck ledgers and between 2 and 5 inches in from the ends. Lag screws or bolts are staggered from the top to the bottom along the horizontal run of the deck ledger. R502.2.2.1.1	
☐	16	Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self- supporting. R502.2.2	
☐	17	Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3 (1) shall be permitted when supporting a light-frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3 (2). R502.3.3	

TABLE R502.3.3.2 (adapted)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING EXTERIOR BALCONY [a,b,e.]

		Maximum Cantilever Span
MEMBER SIZE	**SPACING (inches)**	**LIVE LOAD 50 psf. [c,d]**
2X8	12	39”
2X8	16	34”
2X10	12	57”
2X10	16	49”
2X10	24	40”
2X12	16	67”
2X12	24	54”

a	Spans are based on No. 2 grade lumber of Douglas Fir-Larch, Hem-Fir, Southern Pine, and Spruce-Pine-Fir for repetitive (3 or more) members.
b	Ratio of backspan to cantilever span shall be at least 2:1
c	Connections capable of resisting the indicated uplift force shall be provided at the backspan support.
d	Uplift force is for a backspan to cantilever ratio of 2:1. Tabulated uplift values are permitted to be reduced by multiplying by a factor equal to 2 divided by the actual backspan ratio (2/backspan ratio).
e	A full-depth rim joist shall be provided at the unsupported end of the cantilever joists. Solid blocking shall be provided at the support end.

Table R502.3.3(2)

☐	18	Lateral load connections required by Section R502.2.2 shall be permitted to be in accordance with Figure R502.2.2.3. Hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds. R502.2.2.3

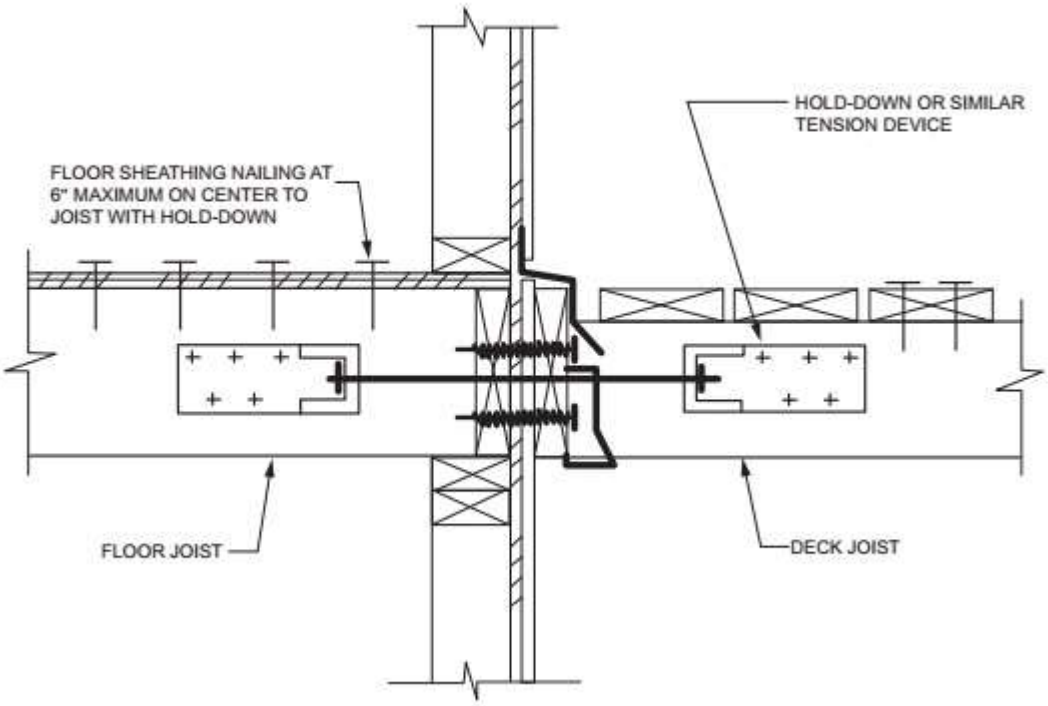
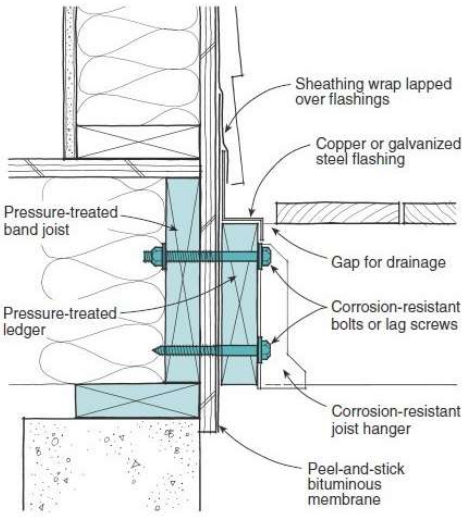


FIGURE R507.9.2(1) Deck Attachment for Lateral Loads

☐	19		Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacture's instructions" R507.2.2.5
☐	20		*"Flashing shall be corrosion-resistant metal of nominal thickness not less than 0.019 inch (0.48 mm) or approved nonmetallic material that is compatible with the substrate of the structure and the decking materials" CRC R507.2.4*
		1	Continuously above all projecting wood trim.
		2	Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.



RESIDENTIAL ZONING INSPECTION AT FRAME

Many projects will require a Zoning Inspection to verify compliance with Planning Conditions of Approval. Items relating to setback, building height, materials, and grading may be required to be inspected at the Rough Stage. Below is a list of common items that may be required. Always refer to the project's specific Conditions of Approval for specific requirements.

RESIDENTIAL ZONING INSPECTION CHECKLIST	
PRIOR TO "OK TO POUR" verify the following:	
☐	SETBACKS from property lines per plan (see Zoning Setbacks)
☐	DISTANCE from EDGE of PAVEMENT OK (DW depth 18'min.)
☐	FINISHED GRADE at footprint per plot plan or survey.
☐	GARAGE PAD elevation per plan.
☐	RETAINING WALLS per plan (max. height, location).
PRIOR TO "ROOF FRAMING & NAILING) verify the following:	
☐	FINISHED GRADE at footprint per plot plan or survey.
☐	ROOF PEAK/RIDGE elevations & eave elevations per plan.
☐	FLOOR-to-CEILING heights per plan.
☐	ROOF FORM per plan (pitch, hip vs. gable, dormers, chimneys, etc.)
PRIOR TO "OK TO COVER" verify the following	
☐	WINDOWS AND DOORS per plan (type, location, trim/sill detailing, #, size, gridding).
☐	BUILDING PROJECTIONS, bays, recesses, terrace forms (etc.) that divide blocky forms, interrupt flat wall planes and/or step building bulk up hillsides are per plan.
☐	EAVE DEPTH is per plan.
☐	# of KITCHENS per plan (wet bars, laundry rooms, in-law units, au pair studios).
☐	INTERNAL ACCESS to all habitable floor areas & levels is OK.
PRIOR TO "OK TO OCCUPY" verify the following:	
☐	PORCHES, DECKS, STAIRS-LANDINGS in setbacks per plan.
☐	FINISHED GRADE at footprint per plot plan or survey.
☐	ROOF PEAK/RIDGE elevations & eave elevations per plan.
☐	ROOF FORM per plan (pitch, hip vs. gable, dormers, chimneys, etc.)
☐	PARKING per plan (min. #, size, maneuvering aisles, access).
☐	LARGE FLAT WALLS are SCREENED with landscaping.
☐	Exterior MATERIALS per plan (stucco vs. siding, combination).
☐	Architectural DETAILING per plan (corner & horizontal trim bands, corbels, columns, etc).
☐	EXTERIOR LIGHTING (shielded 1" below the bulb, no flooding)
☐	BALCONY/STAIR RAILING per plan (open vs. closed, material).
☐	RETAINING WALLS per plan (max. height, location, finish and screening).
☐	DRIVEWAY per plan (19' max. curb cut, 9' min. width, location, slope, paving, railing design).
☐	WALKWAYS/STAIRS per plan (location, decorative treatment).
☐	PAVEMENT AREA LIMITED per plan (location, decorative treatment).
☐	TRELLIS/ARBORS per plan (max. height, location).

☐	EROSION CONTROL on all disturbed slopes (jute, hydro-seed, terracing, ground cover).
☐	TREE & SHRUB ETC, PLANTING per plan approved landscape & irrigation plan. (Min #, type, size, location).
☐	IRRIGATION provided.
☐	SCREENING (high building walls, parking, utilities, no visual blockage of street).
☐	FENCING AND ENTRY GATES per plan (design, height, location)
☐	TRASH ENCLOSURE per plan (location, recycling area, design, screening).
☐	HISTORICAL PROPERTIES EXTERIOR CHANGES exactly per pan.
☐	Confirm compliance with all “ZONING CONDITIONS OF APPROVAL“ (see Zoning Approval Letter attached to Bldg Plans).

EXTERIOR PLY/SHEAR WALL SHEATHING

EXTERIOR PLY AND SHEAR WALL SHEATHING CHECKLIST		
1	Address to be posted, visible from road.	
2	Toilet facilities are on-site. OMC 15.04.070	
3	Construction site is safe for inspection. Boards with nails and excessive debris removed. Ladders and scaffold properly secured.	
4	Best Management Practices (BMP) are in place for storm-water control.	
5	Approved plans and permit card are on the jobsite.	
6	Roof framing: Rafter and ceiling joist size, spacing and design per approved plans.	
7	Min. attic ventilation no less than 1/150 the of the attic area. Openings w/wire galvanized wire mesh 1/16" min. and 1/4" max.	
8	Roof Height per approved plan. OPC	
9	Braced Wall Panel location and size per approved plans.	
10	Sheathing materials shall be per plan. Example: if plans call for plywood, OSB may not be used, except when approved by the Plan Check Engineer.	
11	Nailing pattern per approved plans. OR.	
12	Sheathing to be nailed between 3/8" and 3/4" from joint edges.	
12	Sheathing edges, for walls, occur over framing.	
13	Nail heads do not break the sheathing veneer.	
14	All "shiners" have been removed and re-nailed.	
15	Nails, anchor bolts and washers in contact with pressure-treated wood are galvanized.	
16	Roof sheathing has been completed and nailed per the approved plans.	
17	Minimum 2 anchor bolts/straps per piece of sill plate.	
18	3"x3" square washers are installed with anchor bolts.	
19	Minimum 4" distance from end of sill, Max 12" from end of sill	
20	All hardware (straps, clips, etc.) is installed per the approved plans. All required nail holes are filled.	
21	Paper, window flashing and/or trim has not been installed. All nailing is to be visible for inspection.	
22	Sole plate nailing has been completed, per the approved plan.	
23	**ENGINEERED SHEAR WALLS**	
24	Engineer's structural observation report is on-site, if applicable. Refer to plans.	
25	Special Inspection field reports, such as shop and field welding, installation of epoxy and expansion anchors, etc. shall be onsite at time of inspection.	
26	Any deviations from the approved plans shall be reviewed by the registered design professional and a revised detail and/or letter is on-site.	
27	Shear wall (exterior and interior) has been completed and nailed per the approved plans.	
	A -The nailing schedule shall be painted on each shear wall.	
	B -Complete all shear walls and transfers per details.	

28	Verify that all anchor bolts and hold-downs are sized and spaced per shear wall schedule.	
29	Sill plate and framing sizes at shear walls are per the shear wall schedule.	
30	Double stud hold-down posts are stitch nailed per approved plan/engineering.	
31	Spalling of 1”-4” at hold-downs is addressed by the engineer.	
32	Ladder on-site for access to roof.	

TABLE R602.3(3)

REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES[a, b, c]

MINIMUM NAIL		MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING		ULTIMATE DESIGN WIND SPEED V_{ult} (mph)		
							Wind exposure category		
Size	Penetration (inches)				Edges (inches o.c.)	Field (inches o.c.)	B	C	D
6d Common (2.0" × 0.113")	1.5	24/0	$^3/_8$	16	6	12	140	115	110
8d Common (2.5" × 0.131")	1.75	24/16	$^7/_{16}$	16	6	12	170	140	135
				24	6	12	140	115	110

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

1. 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.

2. 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.

3. 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

PLYWOOD AND OSB NAILING

Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard 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" × 0.113") nail (subfloor, wall)[i] 8d common ($2^{1}/_{2}$" × 0.131") nail (roof); or RSRS-01 ($2^{3}/_{8}$" × 0.113") nail (roof)[j]	6	12[f]
31	$^{19}/_{32}$" — 1"	8d common nail ($2^{1}/_{2}$" × 0.131"); or RSRS-01; ($2^{3}/_{8}$" × 0.113") nail (roof)[j]	6	12[f]
32	$1^{1}/_{8}$" — $1^{1}/_{4}$"	10d common (3" × 0.148") nail; or 8d ($2^{1}/_{2}$" × 0.131") deformed nail	6	12

ROOF FRAME NAILING

TABLE R602.3(1)
FASTENING SCHEDULE

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a, b, c]	SPACING AND LOCATION
Roof			
1	Blocking between ceiling joists or rafters to top plate	4-8d box ($2^1/_2$" × 0.113") or 3-8d common ($2^1/_2$" × 0.131"); or 3-10d box (3" × 0.128"); or 3-3" × 0.131" nails	Toe nail
2	Ceiling joists to top plate	4-8d box ($2^1/_2$" × 0.113"); or 3-8d common ($2^1/_2$" × 0.131"); or 3-10d box (3" × 0.128"); or 3-3" × 0.131" nails	Per joist, toe nail
3	Ceiling joist not attached to parallel rafter, laps over partitions (see Section R802.5.2 and Table R802.5.2)	4-10d box (3" × 0.128"); or 3-16d common ($3^1/_2$" × 0.162"); or 4-3" × 0.131" nails	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.5.2 and Table R802.5.2)	Table R802.5.2	Face nail
5	Collar tie to rafter, face nail or $1^1/_4$" × 20 ga. ridge strap to rafter	4-10d box (3" × 0.128"); or 3-10d common (3" × 0.148"); or 4-3" × 0.131" nails	Face nail each rafter
6	Rafter or roof truss to plate	3-16d box nails ($3^1/_2$" × 0.135"); or 3-10d common nails (3" × 0.148"); or 4-10d box (3" × 0.128"); or 4-3" × 0.131" nails	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss[i]
7	Roof rafters to ridge, valley or hip rafters or roof rafter to minimum 2" ridge beam	4-16d ($3^1/_2$" × 0.135"); or 3-10d common (3" × 0.148"); or 4-10d box (3" × 0.128"); or 4-3" × 0.131" nails	Toe nail

		3-16d box $3^1/_2$" × 0.135"); or 2-16d common ($3^1/_2$" × 0.162"); or 3-10d box (3" × 0.128"); or 3-3" × 0.131" nails	End nail

ROOF SHEATHING

Allowable spans for lumber used as roof sheathing shall conform to Table R803.1. Spaced lumber sheathing for wood shingle and shake roofing shall conform to the requirements of Sections R905.7 and R905.8. Spaced lumber sheathing is not allowed in Seismic Design Category D_2.

TABLE R803.1

MINIMUM THICKNESS OF LUMBER ROOF SHEATHING

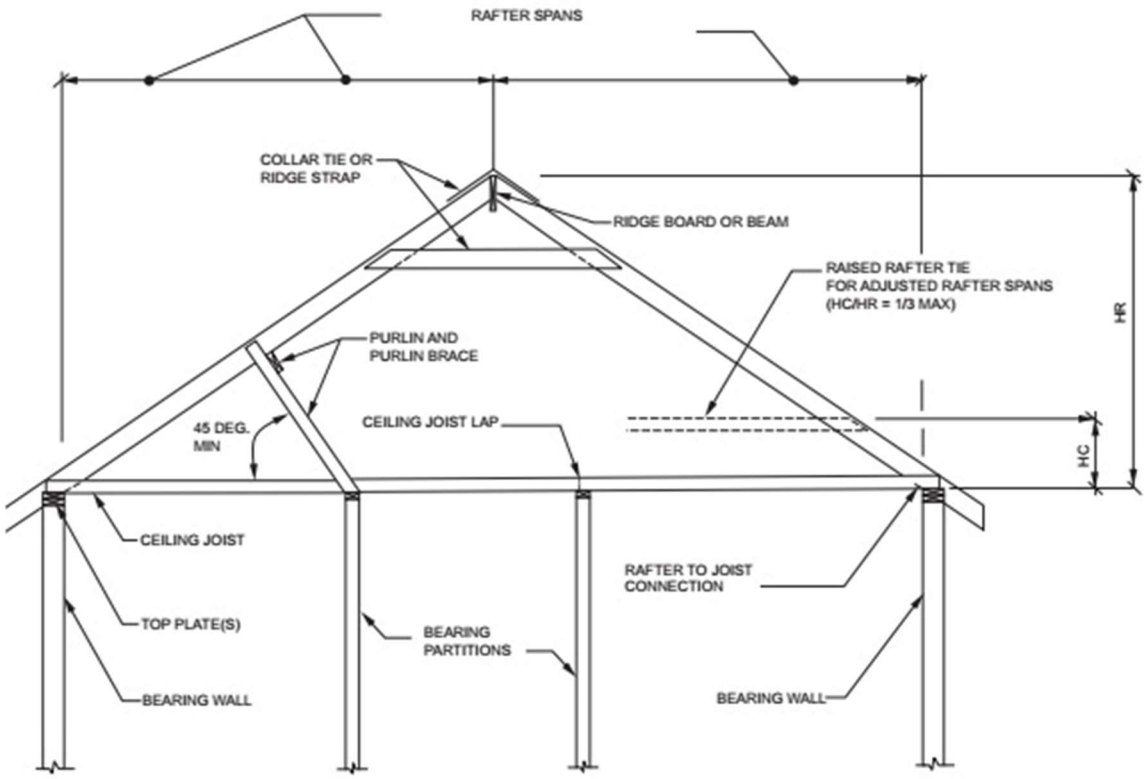
RAFTER OR BEAM SPACING (inches)	**MINIMUM NET THICKNESS (inches)**
24	$^5/_8$
48[a]	$1^1/_2$ T & G
60[b]	
72[c]	

For SI: 1 inch = 25.4 mm.

1. Minimum 270 F_b, 340,000 *E.*
2. Minimum 420 F_b, 660,000 *E.*
3. Minimum 600F_b, 1,150,000 *E.*

ROOF JOISTS

Installation of purlins to reduce the span of rafters is permitted as shown in Figure R802.4.5. Purlins shall be sized not less than the required size of the rafters that they support. Purlins shall be continuous and shall be supported by 2-inch by 4-inch (51 mm by 102 mm) braces installed to bearing walls at a slope not less than 45 degrees (0.79 rad) from the horizontal. The braces shall be spaced not more than 4 feet (1219 mm) on center and the unbraced length of braces shall not exceed 8 feet (2438 mm).



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.018 rad.

H_C = Height of ceiling joists or rafter ties measured vertically above the top of rafter support walls.

H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

CEILING JOIST SPANS per TABLE R802.5.1 (1)

CEILING JOIST SPANS FOR COMMON LUMBER SPECIES (Uninhabitable attics with limited storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch	SS	10-5	16-4	21-7	Note a
	Douglas fir-larch	#1	10-0	15-9	20-1	24-6
	Douglas fir-larch	#2	9-10	15-0	19-1	23-3
	Douglas fir-larch	#3	7-10	11-6	14-7	17-9
	Hem-fir	SS	9-10	15-6	20-5	Note a
	Hem-fir	#1	9-8	15-2	19-10	24-3
	Hem-fir	#2	9-2	14-5	18-6	22-7
	Hem-fir	#3	7-8	11-2	14-2	17-4
	Southern pine	SS	10-3	16-1	21-2	Note a
	Southern pine	#1	9-10	15-6	20-5	24-0
	Southern pine	#2	9-3	13-11	17-7	20-11
	Southern pine	#3	7-2	10-6	13-3	16-1
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5
	Spruce-pine-fir	#1	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#2	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#3	7-8	11-2	14-2	17-4
16	Douglas fir-larch	SS	9-6	14-11	19-7	25-0
	Douglas fir-larch	#1	9-1	13-9	17-5	21-3
	Douglas fir-larch	#2	8-11	13-0	16-6	20-2
	Douglas fir-larch	#3	6-10	9-11	12-7	15-5
	Hem-fir	SS	8-11	14-1	18-6	23-8
	Hem-fir	#1	8-9	13-7	17-2	21-0
	Hem-fir	#2	8-4	12-8	16-0	19-7
	Hem-fir	#3	6-8	9-8	12-4	15-0
	Southern pine	SS	9-4	14-7	19-3	24-7
	Southern pine	#1	8-11	14-0	17-9	20-9
	Southern pine	#2	8-0	12-0	15-3	18-1
	Southern pine	#3	6-2	9-2	11-6	14-0
	Spruce-pine-fir	SS	8-9	13-9	18-1	23-1
	Spruce-pine-fir	#1	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#2	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#3	6-8	9-8	12-4	15-0
19.2	Douglas fir-larch	SS	8-11	14-0	18-5	23-7
	Douglas fir-larch	#1	8-7	12-6	15-10	19-5
	Douglas fir-larch	#2	8-2	11-11	15-1	18-5
	Douglas fir-larch	#3	6-2	9-1	11-6	14-1
	Hem-fir	SS	8-5	13-3	17-5	22-3
	Hem-fir	#1	8-3	12-4	15-8	19-2
	Hem-fir	#2	7-10	11-7	14-8	17-10
	Hem-fir	#3	6-1	8-10	11-3	13-8
	Southern pine	SS	8-9	13-9	18-2	23-1
	Southern pine	#1	8-5	12-9	16-2	18-11
	Southern pine	#2	7-4	11-0	13-11	16-6
	Southern pine	#3	5-8	8-4	10-6	12-9

	Spruce-pine-fir	SS	8-3	12-11	17-1	21-8
	Spruce-pine-fir	#1	8-0	11-9	14-10	18-2
	Spruce-pine-fir	#2	8-0	11-9	14-10	18-2
	Spruce-pine-fir	#3	6-1	8-10	11-3	13-8
24	Douglas fir-larch	SS	8-3	13-0	17-2	21-3
	Douglas fir-larch	#1	7-8	11-2	14-2	17-4
	Douglas fir-larch	#2	7-3	10-8	13-6	16-5
	Douglas fir-larch	#3	5-7	8-1	10-3	12-7
	Hem-fir	SS	7-10	12-3	16-2	20-6
	Hem-fir	#1	7-7	11-1	14-0	17-1
	Hem-fir	#2	7-1	10-4	13-1	16-0
	Hem-fir	#3	5-5	7-11	10-0	12-3
	Southern pine	SS	8-1	12-9	16-10	21-6
	Southern pine	#1	7-8	11-5	14-6	16-11
	Southern pine	#2	6-7	9-10	12-6	14-9
	Southern pine	#3	5-1	7-5	9-5	11-5
	Spruce-pine-fir	SS	7-8	12-0	15-10	19-5
	Spruce-pine-fir	#1	7-2	10-6	13-3	16-3
	Spruce-pine-fir	#2	7-2	10-6	13-3	16-3
	Spruce-pine-fir	#3	5-5	7-11	10-0	12-3

Check sources for availability of lumber in lengths greater than 20 feet.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

1. Span exceeds 26 feet in length.

RAFTER SPANS PER TABLE R802.4.1(2)

RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch	SS	10-5	16-4	21-7	Note b	Note b	10-5	16-4	21-7	Note b	Note b
	Douglas fir-larch	#1	10-0	15-9	20-10	Note b	Note b	10-0	15-4	19-5	23-9	Note b
	Douglas fir-larch	#2	9-10	15-6	20-5	26-0	Note b	9-10	14-7	18-5	22-6	26-0
	Douglas fir-larch	#3	8-9	12-10	16-3	19-10	23-0	7-7	11-1	14-1	17-2	19-11
	Hem-fir	SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	20-5	Note b	Note b
	Hem-fir	#1	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-2	23-5	Note b
	Hem-fir	#2	9-2	14-5	19-0	24-3	Note b	9-2	14-2	17-11	21-11	25-5
	Hem-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Southern pine	SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	Note b	Note b
	Southern pine	#1	9-10	15-6	20-5	Note b	Note b	9-10	15-6	19-10	23-2	Note b
	Southern pine	#2	9-5	14-9	19-6	23-5	Note b	9-0	13-6	17-1	20-3	23-10
	Southern pine	#3	8-0	11-9	14-10	18-0	21-4	6-11	10-2	12-10	15-7	18-6
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-11	25-5	Note b
	Spruce-pine-fir	#1	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#2	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
16	Douglas fir-larch	SS	9-6	14-11	19-7	25-0	Note b	9-6	14-11	19-7	25-0	Note b
	Douglas fir-larch	#1	9-1	14-4	18-11	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch	#2	8-11	14-1	18-5	22-6	26-0	8-7	12-7	16-0	19-6	22-7
	Douglas fir-larch	#3	7-7	11-1	14-1	17-2	19-11	6-7	9-8	12-2	14-11	17-3
	Hem-fir	SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	18-6	23-8	Note b
	Hem-fir	#1	8-9	13-9	18-1	23-1	Note b	8-9	13-1	16-7	20-4	23-7
	Hem-fir	#2	8-4	13-1	17-3	21-11	25-5	8-4	12-3	15-6	18-11	22-0
	Hem-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10

	Southern pine	SS	9-4	14-7	19-3	24-7	Note b	9-4	14-7	19-3	24-7	Note b
	Southern pine	#1	8-11	14-1	18-6	23-2	Note b	8-11	13-7	17-2	20-1	23-10
	Southern pine	#2	8-7	13-5	17-1	20-3	23-10	7-9	11-8	14-9	17-6	20-8
	Southern pine	#3	6-11	10-2	12-10	15-7	18-6	6-0	8-10	11-2	13-6	16-0
	Spruce-pine-fir	SS	8-9	13-9	18-1	23-1	Note b	8-9	13-9	18-1	23-0	Note b
	Spruce-pine-fir	#1	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#2	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
19.2	Douglas fir-larch	SS	8-11	14-0	18-5	23-7	Note b	8-11	14-0	18-5	23-0	Note b
	Douglas fir-larch	#1	8-7	13-6	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch	#2	8-5	13-3	16-10	20-7	23-10	7-10	11-6	14-7	17-10	20-8
	Douglas fir-larch	#3	6-11	10-2	12-10	15-8	18-3	6-0	8-9	11-2	13-7	15-9
	Hem-fir	SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	17-5	22-3	25-9
	Hem-fir	#1	8-3	12-11	17-1	21-5	24-10	8-2	12-0	15-2	18-6	21-6
	Hem-fir	#2	7-10	12-4	16-3	20-0	23-2	7-8	11-2	14-2	17-4	20-1
	Hem-fir	#3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Southern pine	SS	8-9	13-9	18-2	23-1	Note b	8-9	13-9	18-2	23-1	Note b
	Southern pine	#1	8-5	13-3	17-5	21-2	25-2	8-4	12-4	15-8	18-4	21-9
	Southern pine	#2	8-1	12-3	15-7	18-6	21-9	7-1	10-8	13-6	16-0	18-10
	Southern pine	#3	6-4	9-4	11-9	14-3	16-10	5-6	8-1	10-2	12-4	14-7
	Spruce-pine-fir	SS	8-3	12-11	17-1	21-9	Note b	8-3	12-11	17-1	21-0	24-4
	Spruce-pine-fir	#1	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#2	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
24	Douglas fir-larch	SS	8-3	13-0	17-2	21-10	Note b	8-3	13-0	16-10	20-7	23-10
	Douglas fir-larch	#1	8-0	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Douglas fir-larch	#2	7-10	11-11	15-1	18-5	21-4	7-0	10-4	13-0	15-11	18-6
	Douglas fir-larch	#3	6-2	9-1	11-6	14-1	16-3	5-4	7-10	10-0	12-2	14-1
	Hem-fir	SS	7-10	12-3	16-2	20-8	25-1	7-10	12-3	16-2	19-10	23-0
	Hem-fir	#1	7-8	12-0	15-8	19-2	22-2	7-4	10-9	13-7	16-7	19-3
	Hem-fir	#2	7-3	11-5	14-8	17-10	20-9	6-10	10-0	12-8	15-6	17-11

	Hem-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	20-10	24-8
	Southern pine	#1	7-10	12-3	16-2	18-11	22-6	7-5	11-1	14-0	16-5	19-6
	Southern pine	#2	7-4	11-0	13-11	16-6	19-6	6-4	9-6	12-1	14-4	16-10
	Southern pine	#3	5-8	8-4	10-6	12-9	15-1	4-11	7-3	9-1	11-0	13-1
	Spruce-pine-fir	SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-4	18-9	21-9
	Spruce-pine-fir	#1	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#2	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

1. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the following factors:

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

2. where:
3. H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
4. H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
5. Span exceeds 26 feet in length.

Chapter 5 ROUGH INSPECTION

This inspection is performed after the house is weathertight, including the exterior building paper with stucco lath or siding installed. The roof should have the underlayment installed and the roofing materials evenly loaded across the house, or the roofing may be completed. All exterior doors and windows should be installed.

The Rough-in inspection can also be an involved inspection, depending on the size and materials used for the house. These steps and procedures are just the basic overview of what is necessary for the inspection.

ROUGH INSPECTION (TYPICAL MINIMUM REQUIREMENTS)

Prior to this inspection, all required sequential inspections and correction notices must be completed.
This is not an all-inclusive list and additional items may be required as determined during the inspection.

ROUGH INSPECTION-CHECKLIST	
JOBSITE, PLANS AND SPECIAL INSPECTIONS	
Address to be posted, visible from road. ADU's require separate address posted and visible from road. CRC R319 & OMC 15.40.010	
Construction site is safe for inspection. Boards with nails and excessive debris removed. Ladders and scaffold properly secured. OSHA 1926.25	
Ensure compliance with Waste Reduction and Recycling Plan (WRRP) with Construction and Demolition Summary Report (CDSR) required at Final- if applicable to job. OMC 18.02.100	
Toilet facilities are on-site. Portable units shall have a catch pan. CPC 412.6	
Best Management Practices (BMP) are in place for storm-water control. OMC 15.04.3.2240	
Approved plans and permit card are on the job-site. CRC & R105.7, R106.3.1	
Engineer's Special Inspection and/or Structural Observation reports are on-site, if applicable. Engineer "daily" acceptable at rough with wet stamped originals by Final. CRC R109.1.5.2, CBC Chapter 17	
Fire Sprinklers: Automatic fire sprinkler systems are required for all new one and two family dwellings. Exception: additions and alterations.	
Sprinkler systems must be inspected and approved by the local fire jurisdiction having authority at rough frame and again at Final. CRC R313	
All Deferred Submittals e.g. prefabricated roof truss systems, prefabricated floor truss systems, prefabricated metal or spiral stair systems, etc.. shall be on-site and provided to the inspector. CRC R502.11.4, CBC [A] 107.3.4.1	
Any deviations from the approved plans have been reviewed by the design engineer and a revised detail and/or letter is on-site. CRC R106.4	
Rough Frame inspection shall occur AFTER all rough electrical, plumbing, mechanical inspections have been completed and passed. CRC R109.1.4. Approval to insulate comes AFTER Rough Frame has passed. CRC R109.1.5	
EXTERIOR	
R300.3 Site Drainage. Surface, subsurface, potable, and equipment drainage water shall be conveyed in an approved manner to an adequate and approved downstream transportation facility. If percolating or discharging within the site, energy dissipation measures shall be installed to prevent erosion. Runoff shall not surface closer than 15 feet to the property lines. No augmented runoff may cross the property lines	
Fire-rating of exterior walls, projections, openings and penetrations WITHOUT sprinklers CRC R302.1(1). For projects with sprinklers please see CRC R302.1(2). • Walls 5-feet or less from the property line (PL) require a 1-hour rating tested in accordance with ASTM E119, UL 263 or CBC 703.3. Fire assumed from both sides of wall. Typically 5/8 Type X gypsum at the interior with 5/8 Type X (or equivalent e.g. dens glass) under siding. 5/8 Type X not required under 3-coat stucco. (ADU walls 4-feet from PL require 1-hour rating)	

• Projections (e.g. roof eaves) are NOT allowed 2-feet or closer to the PL. Non-combustible gutter and downspout OK if not over PL. 1 hour on the underside, or heavy timber, or fire- retardant-treated wood;L b	
Exterior Water Resistive Barrier (stucco lath, 15-lb felt, TYVEK or other approved material) has been installed and the windows are in place. The installation of the exterior finishes should immediately follow this inspection as not to void the weather-resistive barrier UV exposure rating. CRC R109.1.5 & R703.1	
Exterior siding and sheathing used in the Wildland Urban Interface Area (WUI) must be listed with the Office of the State Fire Marshall's Building Material Listing. CRC R337.7	
Windows and doors require pan flashings or installed per fenestration manufacturer's installation instructions. Installation instructions to be available. CRC R106.2	
Roofing is complete, including flashings at all penetrations. CRC R109	
All weather-exposed balcony, deck and walking surface waterproofing has been inspected and approved prior to cover. CRC R109.1.5.3	
All penetrations caulks and sealed.	
BUILDING	
CPC 412.6	
Rough Frame inspection shall occur AFTER all rough electrical, plumbing, mechanical inspections have been completed and passed. CRC R109.1.4. Approval to insulate comes AFTER Rough Framing has passed. CRC R109.1.5	
Roofing is complete, including flashings at all penetrations. CRC R109 All weather-exposed balcony, deck and walking surface waterproofing has been inspected and approved prior to cover. CRC R109.1.5.3	
Verify installation of radiant barrier and cool roof products per the approved Title 24 Report and 2016 Residential Compliance Manual.	
Exterior Water Resistive Barrier (stucco lath, 15-lb felt, TYVEK or other approved material) has been installed and the windows are in place. The installation of the exterior finishes should immediately follow this inspection as not to void the weather-resistive barrier UV exposure rating. CRC R109.1.5 & R703.1 Exterior wall siding and sheathing used in the Wildland Urban Interface Area (WUI) must be listed with the Office of the State Fire Marshall, Building Material Listing. CRC R337.7	
Verify all penetrations are caulked and sealed.	
Weep screeds in place minimum 4" above earth and 2" above paved, concrete areas. CRC R703.7.2.1	
Any deviations from the approved plans have been reviewed by the design engineer and a revised detail and/or letter is on-site.	
All framing specified on the plans or engineer's revisions have been completed.	
All Deferred Submittals e.g. Prefabricated Roof Truss Systems, Prefabricated Floor Truss Systems, Prefabricated Metal or Spiral Stair Systems, etc.. shall be on-site and provided to the inspector.	

The correct truss calculations, including the layout, are on-site.	
Engineered roof or floor trusses shall not be field-cut or modified unless by approved plan revision. CRC R502.8.2 Gable end wall braces installed if applicable. Truss documents and calculations on-site.	
Attic draft-stop has been installed, when required, including attic access to both sides. PCC §15.04.175.1 (B)	
Trusses/rafters/floor/deck and ceiling joists are blocked at bearing points.	
Cathedral ceiling ventilation CRC §R806. Enclosed rafter spaces shall have cross ventilation for each separate space. Provide 50% of the required ventilating area at the upper portion of the space and the balance at the eave/lower area of the space. A minimum 1" airspace is required between insulation and roof sheathing. Net free ventilating area shall not be less than 1/150 of the space ventilated.	
Unvented cathedral ceilings and non vented attic assemblies must be installed	
Bedrooms / Basements / Habitable attics window egress min. clear height 24", min. clear width 20", min. 5.7 sq. ft. openable area except at grade floor may be 5.0 sq. ft. Max. sill height 44" clear space to floor or requires ladder.	
Safety glass required when edge of glass is less than 24" from door edge and less than 60" above ground.	
Safety glass required when glass is more than 9 sq. ft .and edge of glass is less than 18" above floor/ground and top edge is more than 36" above ground and within 36" of walking surfaces.	
Safety glass required when glass is within 60" of the waters edge at swimming pool, hot tub, or spa.	
Safety glass required in walls enclosing stairway landings or within 5" of the bottom and top of stairway where the bottom edge of the glass is less than 60" above a walking surface.	
Width: Stairway and hall width shall not be less than 36" finish	
Headroom: Min. 6"-8" (Spiral 6"-6")	
Treads and risers: Maximum riser height shall be 7-3/4" and a minimum of 4" Minimum tread depth shall be 10" with a ¾" nosing or 11" depth.	
Dimensional uniformity at stairs shall be determined from landing to landing from the tallest riser not more than 3/8" to the shortest riser and greatest tread depth not more than 3/8" more than the smallest.	
Winders: Min. 6" tread depth at inner edge and min. 10" tread depth within 12" of inner edge.	
Nosing: max. radius of curvature or beveling of nosing ½". Risers shall be solid and require nosing min. 3/4" max. 1-1/4" except when tread depth is 11" nosing is not required.	
Stairway Landings: There shall be a landing at the top and bottom of each stairway. The width of landings shall not be less than the width of stairways they serve. Every landing shall have a minimum dimension measured in the direction of travel equal to the width of the stairway. Such dimension need not exceed 48" where the stairway has straight run. R-3 occupancies, a floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided a door does not swing over the stairs.	
Vertical rise: Max. 12" between floor levels or landings.	
Insulation baffles are installed at eave vents.. Attic vents meet applicable requirements (where applicable).	
Insulation baffles are installed at "B" vents and flues.	
Attic access is framed to allow opening at least as large as the largest component of the appliance and not less than 22"x30".	

Dwelling units in two-family dwellings shall be separated from each other, and from adjoining spaces, by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.3 of the California Building Code	
Adopt Appendix K Sound Transmission, California Residential Code, in its entirety for multi-unit dwellings. Attached Duplex, Attached ADUs.	
Fire-blocking at the top and bottom of concealed spaces and every 10" in horizontal spaces has been completed.	
End joints in double top plates are offset 48" with 8-16d nails each side, or per engineer's requirements for engineered structures. Top plates notched for piping, A/C line-sets, continuous posts, etc. have been spliced with a structural strap with 8-16d nails each side, or per engineer's requirements for engineered structures.	
Floor sheathing at tub drain is fire-blocked.	
Pocket door frames are in place.	
ELECTRICAL	
All rough electrical is complete. Wiring is terminated in the electrical panels.	
Verify electrical outlet requirements and spacing.	
Sub-panel is not located in a bathroom or clothes closet.	
Arc Fault protection required for outlets in family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas.	
Guest rooms and guest suites that are provided with permanent provisions for cooking shall have arc fault branch circuits installed.	
Overcurrent devices shall be readily accessible, therefore in areas at or above 5,000 ft. elevation, the sub-panel is located at the interior or where not subject to snow build-up.	
Smoke alarms shall be interconnected, hardwired with battery backup, are required on ceiling or wall at each floor level, in each sleeping room and outside each sleeping area. Including basements and habitable attics.	
Carbon Monoxide Alarms shall be installed in dwellings with fuel burning appliances and with attached garages. Detectors shall be interconnected. Detectors shall be installed in each sleeping room and outside each sleeping room area and every floor level including basements, multiple purpose smoke and carbon monoxide alarms are acceptable.	
Electrical boxes are made-up; grounds and neutrals spliced, ground screws, bushings, etc.	
Romex is secured within 12" of boxes and every 4½ '.	
The grounding electrode conductor to the UFER is complete, with access panel.	
Bonding to water and gas piping is complete. Connections are in an accessible location.	
Any electrical panel or disconnect, such as the A/C unit, has the required working clearance. 30" wide by 36" deep.	
A switched light and receptacle are provided in the attic for HVAC equipment.	
Romex within 6" of the attic access is to be protected.	
A receptacle is provided within 25" of outdoor, roof top or ground mounted, equipment.	
Nail protector plates are provided at wiring within 1¼" from the edge of the stud or framing member.	

PLUMBING	
R303.10 Each tenant or owner shall have access to their own mechanical heating equipment and water heater. A central Mechanical Room is permitted provided that each tenant or owner has access without being compelled to pass through another unit	

Plumbing (waste, water, gas, hydronic) systems are on test. Floors are to be dry. Exception: Hydronic heat piping inspection can occur at the insulation inspection, but not later than the drywall inspection.	
Site built shower pans are filled to the top of dam for test. Exception: This inspection can be completed at insulation inspection but not later than the drywall nail inspection.	
Plumbing vents extend through the roof with flashings.	
All piping is supported. Copper every 6", ABS every 4". 70.□ □ Nail protector plates are provided at piping within 1" from the edge of the stud or framing member.	
Water heater relief pipe is terminated outside the building.	
Water heater vent is installed through the roof, with flashing.	
Gas water heater located in garage shall be elevated 18" above floor unless listed as flammable vapor ignition resistant. [NFPA 54:9.1.10.1]	
Water heaters located in the attic or on a subfloor need a water-tight drip pan with a ¾" drain to the exterior of the building.	
Copy of Plumbers certification card for the installation of flexible gas piping. (Per Manufacture)	
Verify that the water heating distribution system is installed and insulated per the minimum requirements of the approved Title 24 Report and 2019 Residential Compliance Manual.	
Backflow device as per CPC 710 is required for fixtures that are below the crown of the Sewer Main. The backflow device shall only serve the fixtures with this condition AND NOT the entire building.	
Projects with a valuation over $100,001 must certify that the Private Sewer lateral is compliant with EBMUD PSL Regional Ordinance. If Private Sewer Lateral is to be replaced, a separate SL (Sewer Lateral Permit) from the Department of Transportation (DOT) is required. DOT inspects all PSL permits.	
MECHANICAL	
R303.10 Each tenant or owner shall have access to their own mechanical heating equipment and water heater. A central Mechanical Room is permitted provided that each tenant or owner has access without being compelled to pass through another unit	
Indoor Air Quality and Mechanical Ventilation for all new dwellings and additions larger than 1,000sq.ft. All bathrooms require a minimum 50cfm 3-sone. Kitchen requires minimum 100cfm. 3-sone.	
All ducting is complete.	
Supported every 4" with 1½" straps. Radius of bends are at least equal to the duct diameter. Per manufacture specifications	
All supply and return cans are installed and blocked on all sides.	
The mechanical ducting system shall be installed and insulated per the minimum requirements of the approved Title 24 Report and 2016 Residential Compliance Manual. (§4.4)	
A/C line-set is installed and supported.	
Thermostat wire is installed.	
B-vents for all appliances are set in place. "Single wall pipe is no longer allowed"	
Bathroom exhaust fans and ducts are installed. Ducts to terminate at wall or roof jacks.	
Condensate drains installed per code and manufacturer specifications	
Propane drain provisions are installed.	

Furnaces installed within attic or crawl space areas shall be installed and meet the minimum efficiency and installation requirements of the approved Title 24 Report and 2016 Residential Compliance Manual.	
Verify installation of Indoor Air Quality and Mechanical Ventilation system per approved plan and 2016 Residential Compliance Manual.	

EXTERIOR WALLS AND REQUIRED FIRE PROTECTION

R302.1 Exterior Walls

Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings and accessory buildings equipped throughout with an automatic sprinkler system installed in accordance with Section R313 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of individual dwelling units and their accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

TABLE R302.1(1)

EXTERIOR WALLS

EXTERIOR WALL ELEMENT		**MINIMUM FIRE-RESISTANCE RATING**	**MINIMUM FIRE SEPARATION DISTANCE**
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.3 of the *California Building Code* with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Not allowed	NA	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood[a, b]	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
	Not allowed	NA	< 3 feet

Openings in walls	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet

For SI: 1 foot = 304.8 mm.
NA = Not Applicable.

1. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fire blocking is provided from the wall top plate to the underside of the roof sheathing.
2. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where gable vent openings are not installed.

TABLE R302.1(2)
EXTERIOR WALLS—DWELLINGS AND ACCESSORY BUILDINGS WITH AUTOMATIC RESIDENTIAL FIRE SPRINKLER PROTECTION

EXTERIOR WALL ELEMENT		**MINIMUM FIRE-RESISTANCE RATING**	**MINIMUM FIRE SEPARATION DISTANCE**
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.3 of the *California Building Code* with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet[a]
Projections	Not allowed	NA	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood[b, c]	2 feet[a]
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	Not allowed	NA	< 3 feet
	Unlimited	0 hours	3 feet[a]
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet[a]

For SI: 1 foot = 304.8 mm.

NA = Not Applicable.

1. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section R313, the fire separation distance for exterior walls not fire-resistance rated and for fire-resistance-rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.
2. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fire blocking is provided from the wall top plate to the underside of the roof sheathing.
3. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where gable vent openings are not installed

CITY OF OAKLAND AMMENDMENT

15.04.3.25.010 - CRC Table R302.3 amended.

Section R302.3 of the California Residential Code, replace the first sentence starting with "Dwelling units in two-family dwellings shall…" with the following:

"Dwelling units in two-family dwellings shall be separated from each other, and from adjoining spaces, by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.3 of the California Building Code".

HEADER SPANS (TYPICAL)

Consult with a Licensed Design Professional or install headers as per approved construction documents and structural calculations.

The allowable spans of girders that are fabricated of dimension lumber shall not exceed the values set forth in Table 2308.4.1.1(1) or 2308.4.1.1(2).

TABLE 2308.4.1.1(1)

HEADER AND GIRDER SPANS[a, b] FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir and required number of jack studs)

GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf)[e]																	
		30						50						70					
		Building width[c] (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]
Roof and ceiling	1-2 × 6	4-0	1	3-1	2	2-7	2	3-5	1	2-8	2	2-3	2	3-0	2	2-4	2	2-0	2
	1-2 × 8	5-1	2	3-11	2	3-3	2	4-4	2	3-4	2	2-10	2	3-10	2	3-0	2	2-6	3
	1-2 × 10	6-0	2	4-8	2	3-11	2	5-2	2	4-0	2	3-4	3	4-7	2	3-6	3	3-0	3
	1-2 × 12	7-1	2	5-5	2	4-7	3	6-1	2	4-8	3	3-11	3	5-5	2	4-2	3	3-6	3
	2-2 × 4	4-0	1	3-1	1	2-7	1	3-5	1	2-7	1	2-2	1	3-0	1	2-4	1	2-0	1
	2-2 × 6	6-0	1	4-7	1	3-10	1	5-1	1	3-11	1	3-3	2	4-6	1	3-6	2	2-11	2
	2-2 × 8	7-7	1	5-9	1	4-10	2	6-5	1	5-0	2	4-2	2	5-9	1	4-5	2	3-9	2
	2-2 × 10	9-0	1	6-10	2	5-9	2	7-8	2	5-11	2	4-11	2	6-9	2	5-3	2	4-5	2
	2-2 × 12	10-7	2	8-1	2	6-10	2	9-0	2	6-11	2	5-10	2	8-0	2	6-2	2	5-2	3
	3-2 × 8	9-5	1	7-3	1	6-1	1	8-1	1	6-3	1	5-3	2	7-2	1	5-6	2	4-8	2
	3-2 × 10	11-3	1	8-7	1	7-3	2	9-7	1	7-4	2	6-2	2	8-6	1	6-7	2	5-6	2
	3-2 × 12	13-2	1	10-1	2	8-6	2	11-3	2	8-8	2	7-4	2	10-0	2	7-9	2	6-6	2
	4-2 × 8	10-11	1	8-4	1	7-0	1	9-4	1	7-2	1	6-0	1	8-3	1	6-4	1	5-4	2
	4-2 × 10	12-11	1	9-11	1	8-4	1	11-1	1	8-6	1	7-2	2	9-10	1	7-7	2	6-4	2
	4-2 × 12	15-3	1	11-8	1	9-10	2	13-0	1	10-0	2	8-5	2	11-7	1	8-11	2	7-6	2

Roof, ceiling and one center-bearing floor	1-2 × 6	3-3	1	2-7	2	2-2	2	3-0	2	2-4	2	2-0	2	2-9	2	2-2	2	1-10	2
	1-2 × 8	4-1	2	3-3	2	2-9	2	3-9	2	3-0	2	2-6	3	3-6	2	2-9	2	2-4	3
	1-2 × 10	4-11	2	3-10	2	3-3	3	4-6	2	3-6	3	3-0	3	4-1	2	3-3	3	2-9	3
	1-2 × 12	5-9	2	4-6	3	3-10	3	5-3	2	4-2	3	3-6	3	4-10	3	3-10	3	3-3	4
	2-2 × 4	3-3	1	2-6	1	2-2	1	3-0	1	2-4	1	2-0	1	2-8	1	2-2	1	1-10	1
	2-2 × 6	4-10	1	3-9	1	3-3	2	4-5	1	3-6	2	3-0	2	4-1	1	3-3	2	2-9	2
	2-2 × 8	6-1	1	4-10	2	4-1	2	5-7	2	4-5	2	3-9	2	5-2	2	4-1	2	3-6	2
	2-2 × 10	7-3	2	5-8	2	4-10	2	6-8	2	5-3	2	4-5	2	6-1	2	4-10	2	4-1	2
	2-2 × 12	8-6	2	6-8	2	5-8	2	7-10	2	6-2	2	5-3	3	7-2	2	5-8	2	4-10	3
	3-2 × 8	7-8	1	6-0	1	5-1	2	7-0	1	5-6	2	4-8	2	6-5	1	5-1	2	4-4	2
	3-2 × 10	9-1	1	7-2	2	6-1	2	8-4	1	6-7	2	5-7	2	7-8	2	6-1	2	5-2	2
	3-2 × 12	10-8	2	8-5	2	7-2	2	9-10	2	7-8	2	6-7	2	9-0	2	7-1	2	6-1	2
	4-2 × 8	8-10	1	6-11	1	5-11	1	8-1	1	6-4	1	5-5	2	7-5	1	5-11	1	5-0	2
	4-2 × 10	10-6	1	8-3	2	7-0	2	9-8	1	7-7	2	6-5	2	8-10	1	7-0	2	6-0	2
	4-2 × 12	12-4	1	9-8	2	8-3	2	11-4	2	8-11	2	7-7	2	10-4	2	8-3	2	7-0	2
Roof, ceiling and one clear span floor	1-2 × 6	2-11	2	2-3	2	1-11	2	2-9	2	2-1	2	1-9	2	2-7	2	2-0	2	1-8	2
	1-2 × 8	3-9	2	2-10	2	2-5	3	3-6	2	2-8	2	2-3	3	3-3	2	2-6	3	2-2	3
	1-2 × 10	4-5	2	3-5	3	2-10	3	4-2	2	3-2	3	2-8	3	3-11	2	3-0	3	2-6	3
	1-2 × 12	5-2	2	4-0	3	3-4	3	4-10	3	3-9	3	3-2	4	4-7	3	3-6	3	3-0	4
	2-2 × 4	2-11	1	2-3	1	1-10	1	2-9	1	2-1	1	1-9	1	2-7	1	2-0	1	1-8	1
	2-2 × 6	4-4	1	3-4	2	2-10	2	4-1	1	3-2	2	2-8	2	3-10	1	3-0	2	2-6	2
	2-2 × 8	5-6	2	4-3	2	3-7	2	5-2	2	4-0	2	3-4	2	4-10	2	3-9	2	3-2	2
	2-2 × 10	6-7	2	5-0	2	4-2	2	6-1	2	4-9	2	4-0	2	5-9	2	4-5	2	3-9	3
	2-2 × 12	7-9	2	5-11	2	4-11	3	7-2	2	5-7	2	4-8	3	6-9	2	5-3	3	4-5	3
	3-2 × 8	6-11	1	5-3	2	4-5	2	6-5	1	5-0	2	4-2	2	6-1	1	4-8	2	4-0	2
	3-2 × 10	8-3	2	6-3	2	5-3	2	7-8	2	5-11	2	5-0	2	7-3	2	5-7	2	4-8	2
	3-2 × 12	9-8	2	7-5	2	6-2	2	9-0	2	7-0	2	5-10	2	8-6	2	6-7	2	5-6	3
	4-2 × 8	8-0	1	6-1	1	5-1	2	7-5	1	5-9	2	4-10	2	7-0	1	5-5	2	4-7	2

	4-2 × 10	9-6	1	7-3	2	6-1	2	8-10	1	6-10	2	5-9	2	8-4	1	6-5	2	5-5	2
	4-2 × 12	11-2	2	8-6	2	7-2	2	10-5	2	8-0	2	6-9	2	9-10	2	7-7	2	6-5	2
Roof, ceiling and two center-bearing floors	1-2 × 6	2-8	2	2-1	2	1-10	2	2-7	2	2-0	2	1-9	2	2-5	2	1-11	2	1-8	2
	1-2 × 8	3-5	2	2-8	2	2-4	3	3-3	2	2-7	2	2-2	3	3-1	2	2-5	3	2-1	3
	1-2 × 10	4-0	2	3-2	3	2-9	3	3-10	2	3-1	3	2-7	3	3-8	2	2-11	3	2-5	3
	1-2 × 12	4-9	3	3-9	3	3-2	4	4-6	3	3-7	3	3-1	4	4-3	3	3-5	3	2-11	4
	2-2 × 4	2-8	1	2-1	1	1-9	1	2-6	1	2-0	1	1-8	1	2-5	1	1-11	1	1-7	1
	2-2 × 6	4-0	1	3-2	2	2-8	2	3-9	1	3-0	2	2-7	2	3-7	1	2-10	2	2-5	2
	2-2 × 8	5-0	2	4-0	2	3-5	2	4-10	2	3-10	2	3-3	2	4-7	2	3-7	2	3-1	2
	2-2 × 10	6-0	2	4-9	2	4-0	2	5-8	2	4-6	2	3-10	3	5-5	2	4-3	2	3-8	3
	2-2 × 12	7-0	2	5-7	2	4-9	3	6-8	2	5-4	3	4-6	3	6-4	2	5-0	3	4-3	3
	3-2 × 8	6-4	1	5-0	2	4-3	2	6-0	1	4-9	2	4-1	2	5-8	2	4-6	2	3-10	2
	3-2 × 10	7-6	2	5-11	2	5-1	2	7-1	2	5-8	2	4-10	2	6-9	2	5-4	2	4-7	2
	3-2 × 12	8-10	2	7-0	2	5-11	2	8-5	2	6-8	2	5-8	3	8-0	2	6-4	2	5-4	3
	4-2 × 8	7-3	1	5-9	1	4-11	2	6-11	1	5-6	2	4-8	2	6-7	1	5-2	2	4-5	2
	4-2 × 10	8-8	1	6-10	2	5-10	2	8-3	2	6-6	2	5-7	2	7-10	2	6-2	2	5-3	2
	4-2 × 12	10-2	2	8-1	2	6-10	2	9-8	2	7-8	2	6-7	2	9-2	2	7-3	2	6-2	2
Roof, ceiling and two clear span floors	1-2 × 6	2-3	2	1-9	2	1-5	2	2-3	2	1-9	2	1-5	3	2-2	2	1-8	2	1-5	3
	1-2 × 8	2-10	2	2-2	3	1-10	3	2-10	2	2-2	3	1-10	3	2-9	2	2-1	3	1-10	3
	1-2 × 10	3-4	2	2-7	3	2-2	3	3-4	3	2-7	3	2-2	4	3-3	3	2-6	3	2-2	4
	1-2 × 12	4-0	3	3-0	3	2-7	4	4-0	3	3-0	4	2-7	4	3-10	3	3-0	4	2-6	4
	2-2 × 4	2-3	1	1-8	1	1-4	1	2-3	1	1-8	1	1-4	1	2-2	1	1-8	1	1-4	2
	2-2 × 6	3-4	1	2-6	2	2-2	2	3-4	2	2-6	2	2-2	2	3-3	2	2-6	2	2-1	2
	2-2 × 8	4-3	2	3-3	2	2-8	2	4-3	2	3-3	2	2-8	2	4-1	2	3-2	2	2-8	3
	2-2 × 10	5-0	2	3-10	2	3-2	3	5-0	2	3-10	2	3-2	3	4-10	2	3-9	3	3-2	3
	2-2 × 12	5-11	2	4-6	3	3-9	3	5-11	2	4-6	3	3-9	3	5-8	2	4-5	3	3-9	3
	3-2 × 8	5-3	1	4-0	2	3-5	2	5-3	2	4-0	2	3-5	2	5-1	2	3-11	2	3-4	2
	3-2 × 10	6-3	2	4-9	2	4-0	2	6-3	2	4-9	2	4-0	2	6-1	2	4-8	2	4-0	3

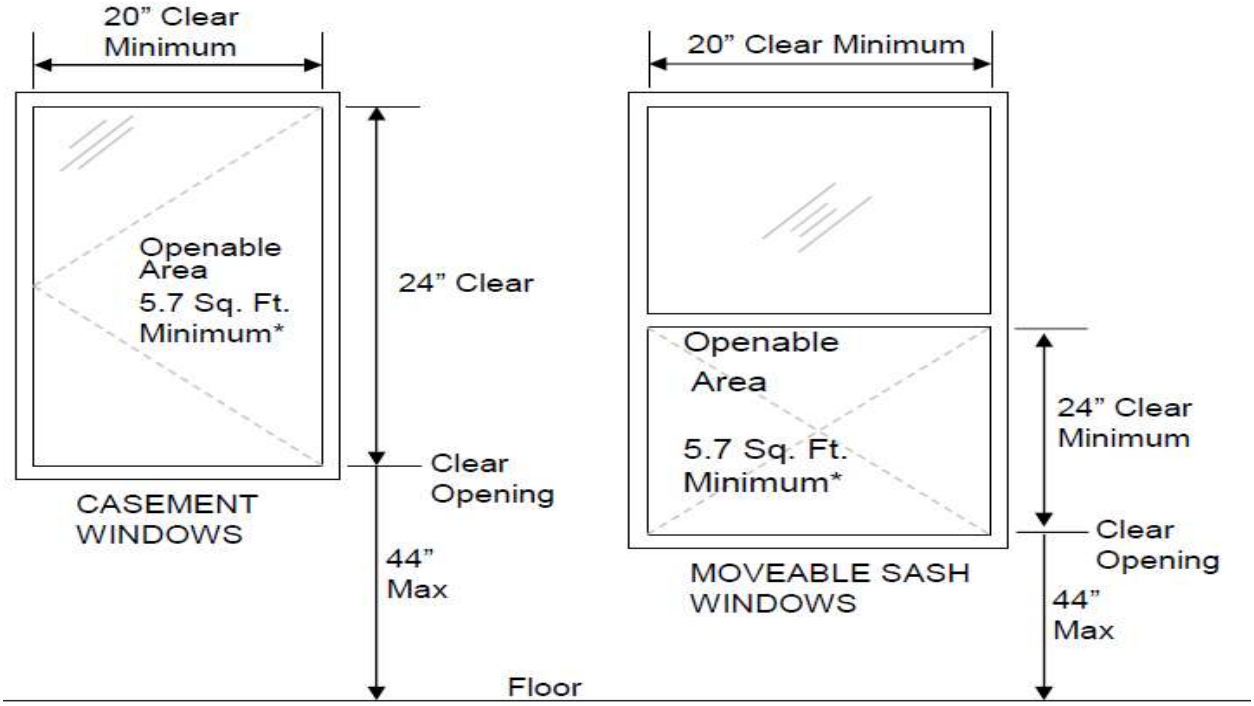
	3-2 × 12	7-5	2	5-8	2	4-9	3	7-5	2	5-8	2	4-9	3	7-2	2	5-6	3	4-8	3
	4-2 × 8	6-1	1	4-8	2	3-11	2	6-1	1	4-8	2	3-11	2	5-11	1	4-7	2	3-10	2
	4-2 × 10	7-3	2	5-6	2	4-8	2	7-3	2	5-6	2	4-8	2	7-0	2	5-5	2	4-7	2
	4-2 × 12	8-6	2	6-6	2	5-6	2	8-6	2	6-6	2	5-6	2	8-3	2	6-4	2	5-4	3

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

1. Spans are given in feet and inches.
2. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine and spruce-pine fir.
3. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
4. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
5. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.
6. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed

EGRESS WINDOWS

MINIMUM SIZE FOR EMERGENCY ESCAPE OR RESCUE WINDOWS FROM SLEEPING ROOMS/BEDROOMS (2019 CBC and CRC)



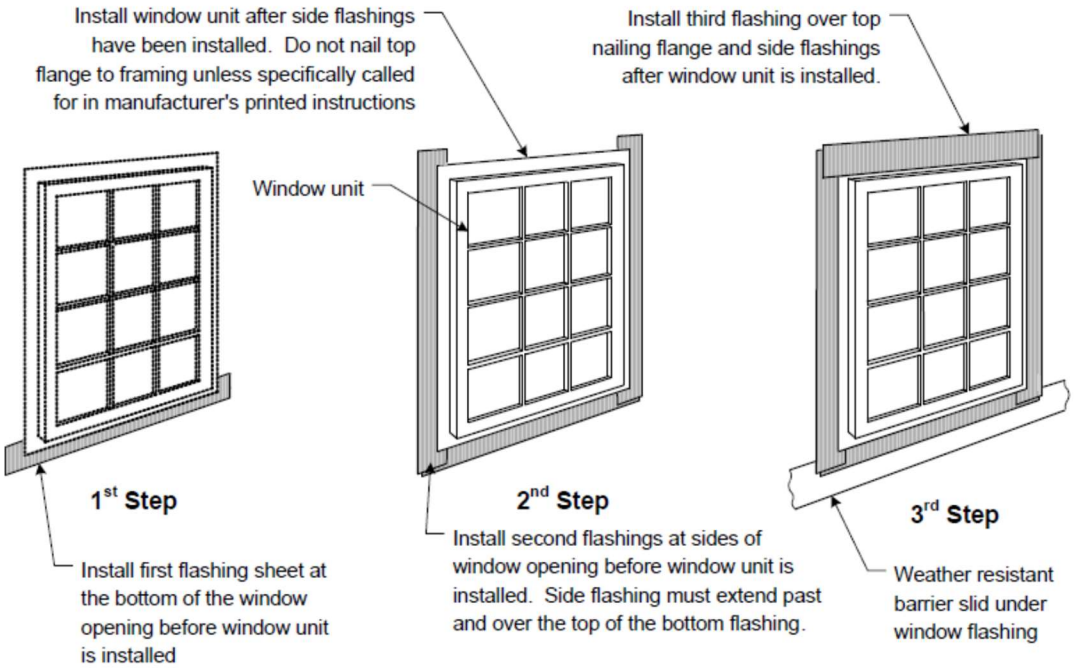
Retrofit windows (not requiring the removal of window frame) shall be allowed to be replaced with the largest window the manufacturer can provide while not making egress worse. Window replacements that requires modifying the framing will require the window to meet egress as per above.

CBC Sections 1203.4 and 1205.2 and CRC R303 require all habitable spaces to have natural ventilation and light by means of exterior glazed openings or by mechanical ventilation and artificial light. For residential, the natural method is always used and the criteria is a minimum opening of 4-perscent of the floor area of the room for ventilation and a minimum net glazed area of 8-percent for light.

CBC Section 1029 and CRC R310 requires one window or door in each bedroom for escape and rescue with a minimum clear net opening of 5.0 square feet at grade floor and a clear net opening of 5.7 square feet for other floors. The minimum net clear opening is 24 inches in height and a minimum net clear opening width of 20 inches. The bottom of the clear opening shall not exceed 44 inches from the floor.

CRC Section R312 requires protection to reduce the likelihood of an occupant accidently falling through an open window. The window fall protection provision is applicable when the window is within 24 inches of the floor and the opening is higher than 72 inches above the outside grade level.

WINDOW FLASHING



CHIMNEY REPAIR

To facilitate the repair of chimneys the following approved procedures and details may be used.
Damaged masonry in reinforced chimneys shall be removed and replaced. Existing reinforcing steel may be used if it can be straightened.

MASONRY CHIMNEYS

Masonry chimneys may be rebuilt using one of the following methods:
1. For chimneys damaged at or above the roof line, use Section “A” together with detail “A-1”, “A-2 “, “A-3”, or “B-1”.
2. For chimneys damaged below the roof line and above the firebox, use Section “B” together with detail “B-1”.

GENERAL NOTES

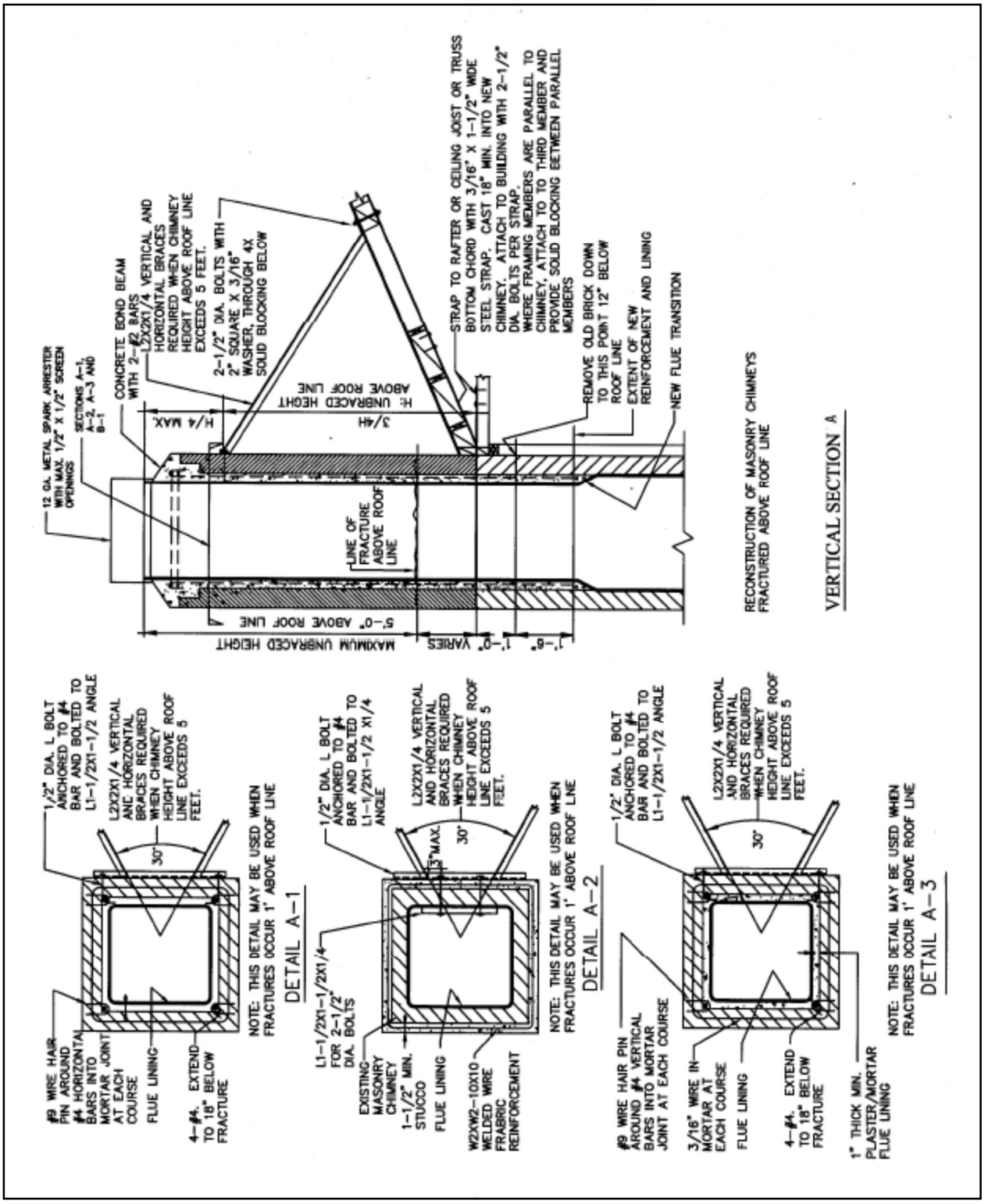
The firebox and undamaged areas of all chimneys to be rebuilt shall be carefully inspected to determine that no cracks or voids are present that would permit the access of flames to the surrounding wood frame. Anchorage straps shall be inspected and, if loose, shall be bolted to joists or rafters.

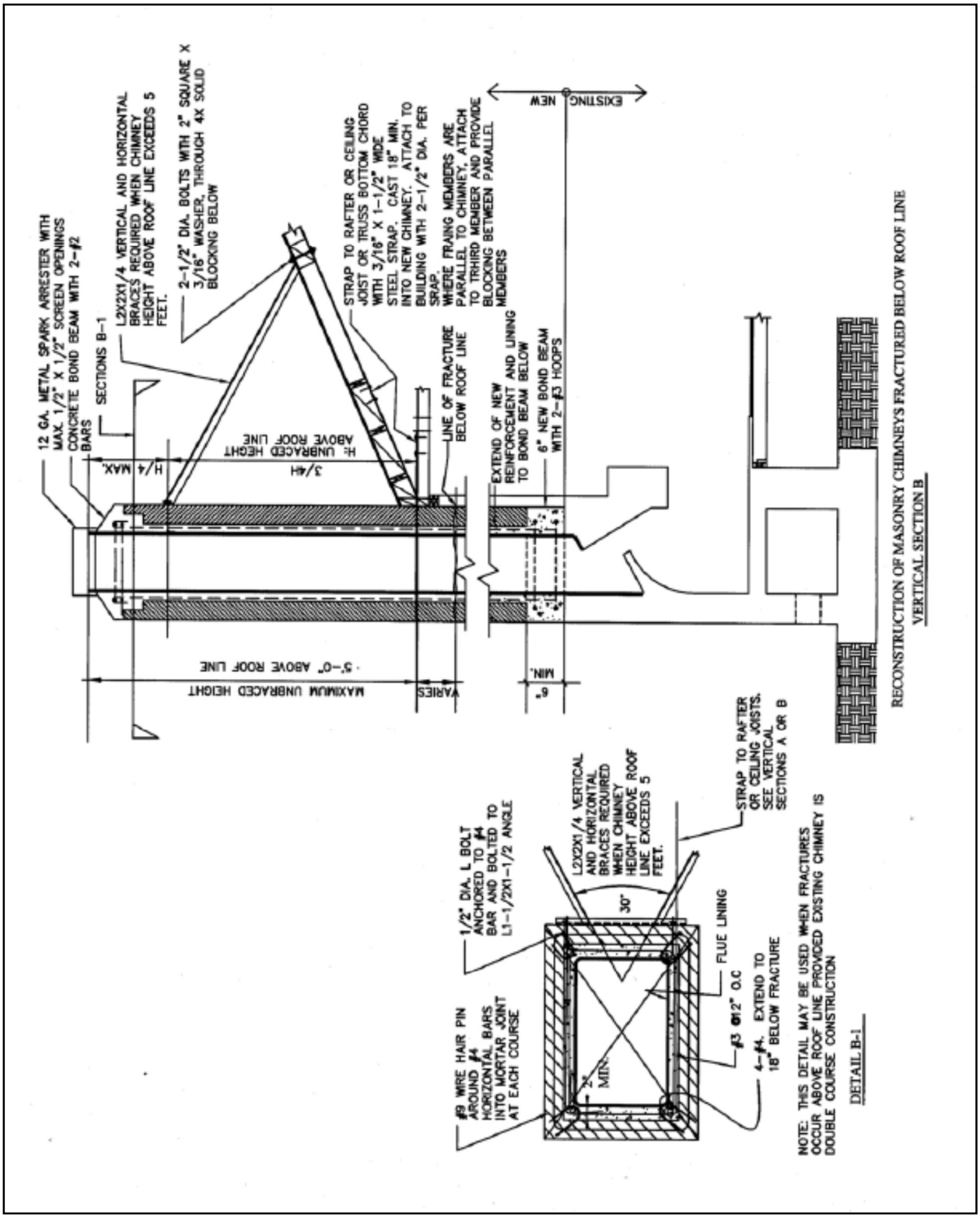
Permits are required for all chimney repairs.

GENERAL SPECIFICATIONS

Masonry:

Brick	(HW Grade) ASTM – designation C73
Concrete:	Grade “C” Concrete
Steel Reinforcing:	ASTM design A615
Mortar:	1 – 4-1/2 – ½ part lime putty or hydrated lime
	1 (Plastic Cement) – 3 max. 1/10 part lime
Grout:	1 – 3 max. 1/10 part lime
Flue Lining:	Terra cotta, fire clay or other UL rated flue liners.


VERTICAL SECTION A
RECONSTRUCTION OF MASONRY CHIMNEYS FRACTURED ABOVE ROOF LINE
12 GA. METAL SPARK ARRESTER WITH MAX. 1/2" X 1/2" SCREEN OPENINGS
SECTIONS A-1, A-2, A-3 AND B-1
CONCRETE BOND BEAM WITH 2-#2 BARS
L2X2X1/4 VERTICAL AND HORIZONTAL BRACES REQUIRED WHEN CHIMNEY HEIGHT ABOVE ROOF LINE EXCEEDS 5 FEET.
2-1/2" DIA. BOLTS WITH 2" SQUARE X 3/16" WASHER, THROUGH 4X SOLID BLOCKING BELOW
H/4 MAX.
3/4H
H UNBRACED HEIGHT ABOVE ROOF LINE
STRAP TO RAFTER OR CEILING JOIST OR TRUSS BOTTOM CHORD WITH 3/16" X 1-1/2" WIDE STEEL STRAP. CAST 18" MIN. INTO NEW CHIMNEY. ATTACH TO BUILDING WITH 2-1/2" DIA. BOLTS PER STRAP. WHERE FRAMING MEMBERS ARE PARALLEL TO CHIMNEY, ATTACH TO THIRD MEMBER AND PROVIDE SOLID BLOCKING BETWEEN PARALLEL MEMBERS
REMOVE OLD BRICK DOWN TO THIS POINT 12" BELOW ROOF LINE
EXTENT OF NEW REINFORCEMENT AND LINING
NEW FLUE TRANSITION
LINE OF FRACTURE ABOVE ROOF LINE
MAXIMUM UNBRACED HEIGHT
5'-0" ABOVE ROOF LINE
VARIES
1'-0"
6"
1'-
1/2" DIA. L BOLT ANCHORED TO #4 BAR AND BOLTED TO L1-1/2X1-1/2 ANGLE
L2X2X1/4 VERTICAL ANC HORIZONTAL BRACES REQUIRED WHEN CHIMNEY HEIGHT ABOVE ROOF LINE EXCEEDS 5 FEET.
30°
#9 WIRE HAIR PIN AROUND #4 HORIZONTAL BARS INTO MORTAR JOINT AT EACH COURSE
FLUE LINING
4-#4, EXTEND TO 18" BELOW FRACTURE
NOTE: THIS DETAIL MAY BE USED WHEN FRACTURES OCCUR 1' ABOVE ROOF LINE
DETAIL A-1
1/2" DIA. L BOLT ANCHORED TO #4 BAR AND BOLTED TO L1-1/2X1-1/2 X1/4 ANGLE
L2X2X1/4 VERTICAL AND HORIZONTAL BRACES REQUIRED WHEN CHIMNEY HEIGHT ABOVE ROOF LINE EXCEEDS 5 FEET.
3" MAX.
30°
L1-1/2X1-1/2X1/4 FOR 2-1/2" DIA. BOLTS
EXISTING MASONRY CHIMNEY
1-1/2" MIN. STUCCO
FLUE LINING
W2XW2-10X10 WELDED WIRE FRABRIC REINFORCEMENT
NOTE: THIS DETAIL MAY BE USED WHEN FRACTURES OCCUR 1' ABOVE ROOF LINE
DETAIL A-2
1/2" DIA. L BOLT ANCHORED TO #4 BAR AND BOLTED TO L1-1/2X1-1/2 ANGLE
L2X2X1/4 VERTICAL AND HORIZONTAL BRACES REQUIRED WHEN CHIMNEY HEIGHT ABOVE ROOF LINE EXCEEDS 5 FEET.
30°
#9 WIRE HAIR PIN AROUND #4 VERTICAL BARS INTO MORTAR JOINT AT EACH COURSE
3/16" WIRE IN MORTAR AT EACH COURSE
FLUE LINING
4-#4, EXTEND TO 18" BELOW FRACTURE
1" THICK MIN. PLASTER/MORTAR FLUE LINING
NOTE: THIS DETAIL MAY BE USED WHEN FRACTURES OCCUR 1' ABOVE ROOF LINE
DETAIL A-3


12 GA. METAL SPARK ARRESTER WITH MAX. 1/2" X 1/2" SCREEN OPENINGS
CONCRETE BOND BEAM WITH 2-#2 BARS
SECTIONS B-1
L2X2X1/4 VERTICAL AND HORIZONTAL BRACES REQUIRED WHEN CHIMNEY HEIGHT ABOVE ROOF LINE EXCEEDS 5 FEET.
2-1/2" DIA. BOLTS WITH 2" SQUARE X 3/16" WASHER, THROUGH 4X SOLID BLOCKING BELOW
STRAP TO RAFTER OR CEILING JOIST OR TRUSS BOTTOM CHORD WITH 3/16" X 1-1/2" WIDE STEEL STRAP. CAST 18" MIN. INTO NEW CHIMNEY. ATTACH TO BUILDING WITH 2-1/2" DIA. PER SRAP.
WHERE FRAING MEMBERS ARE PARALLEL TO CHIMNEY, ATTACH TO TRHIRD MEMBER AND PROVIDE BLOCKING BETWEEN PARALLEL MEMBERS
EXISTING
NEW
H/4 MAX.
3/4H
H: UNBRACED HEIGHT ABOVE ROOF LINE
LINE OF FRACTURE BELOW ROOF LINE
EXTEND OF NEW REINFORCEMENT AND LINING TO BOND BEAM BELOW
6" NEW BOND BEAM WITH 2-#3 HOOPS
MAXIMUM UNBRACED HEIGHT
3'-0" ABOVE ROOF LINE
VARIES
6" MIN.
RECONSTRUCTION OF MASONRY CHIMNEYS FRACTURED BELOW ROOF LINE
VERTICAL SECTION B
1/2" DIA. L BOLT ANCHORED TO #4 BAR AND BOLTED TO L1-1/2X1-1/2 ANGLE
L2X2X1/4 VERTICAL AND HORIZONTAL BRACES REQUIRED WHEN CHIMNEY HEIGHT ABOVE ROOF LINE EXCEEDS 5 FEET.
30°
STRAP TO RAFTER OR CEILING JOISTS. SEE VERTICAL SECTIONS A OR B
#9 WIRE HAIR PIN AROUND #4 HORIZONTAL BARS INTO MORTAR JOINT AT EACH COURSE
FLUE LINING
#3 @12" O.C
4-#4. EXTEND TO 18" BELOW FRACTURE
2" MIN.
NOTE: THIS DETAIL MAY BE USED WHEN FRACTURES OCCUR ABOVE ROOF LINE PROVIDED EXISTING CHIMNEY IS DOUBLE COURSE CONSTRUCTION
DETAIL B-1

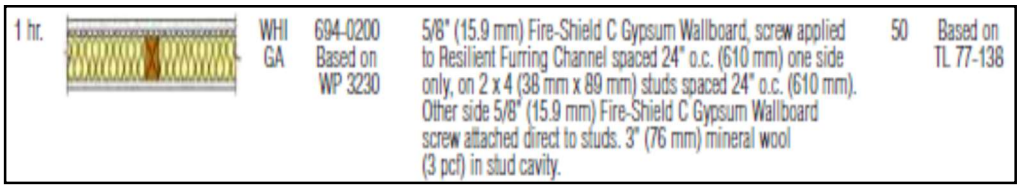
CHIMNEY REPAIR INSPECTION CHECKLIST

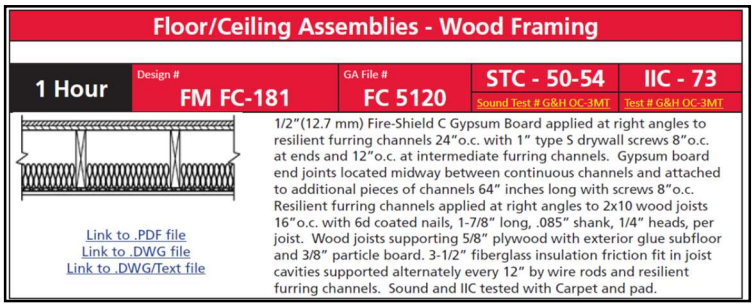
This is not a comprehensive list of requirements, only a general guide for installation

CHIMNEY REPAIR INSPECTION CHECKLIST	
Permit Card available on job site and access to the roof provided.	
A minimum of 4-#4 vertical steel rebars are required. Set 18" min below fracture.	
Two additional #4 vertical steel rebars are required if any chimney dimension is greater than 40"wide.	
Minimum ¼" stirrup must be placed at a maximum of 18" on center.	
Stirrups must be one piece and have lapped extensions of not less than 8".	
Two stirrups must be placed at each bend in vertical rebar.	
Two ¼" stirrups are required at the top of the chimney	
Two 3/16" by 1" steel straps (lateral ties) must be placed at each floor and roof line.	
Straps must be cast at least 12" into chimney with a 180-degree bend with a 6" extension around the vertical rebar.	
Progress Inspection	
Construction must be completed up to the first lateral tie. If multiple lateral ties are required, multiple progress inspections are required	
Vertical rebar must be installed, fully grouted with a minimum of 20" of steel reinforcing bars exposed.	
The steel straps to rafter or ceiling joist must be completely installed and visible for inspection. 3/16"x 1" wide with 2-1/2" dia. bolts per strap.	
Where framing members run parallel to chimney blocking for straps is provided.	
L2x2x1/4" vertical braces installed (for height over 5'above roof line) ½" dia. Bolts on L1-1/2"x1"-1/2" angle anchored to reinforcing steel in chimney an to rafters using 1/2" dia. Bolts w/2x2x3/16" washers	
Top bond beam steel in place 2-#2 Stirrups.	
Final Inspection	
☐ Final inspection includes spark arrester and flashing around chimney.	
☐ Each strap must be bolted with two ½" bolts (lag screws are not acceptable) to the structural members of the building, such as floor joists or rafters, or a 2X4 cross tie nailed to a minimum of 4 joists with 2-16d nails to each joist.	
☐ The chimney must extend 2' above any part of the building within 10' of the chimney	
☐ Access to the roof must be provided. Inspectors DO NOT carry ladders.	
☐ Verify smoke and carbon monoxide detector installation	

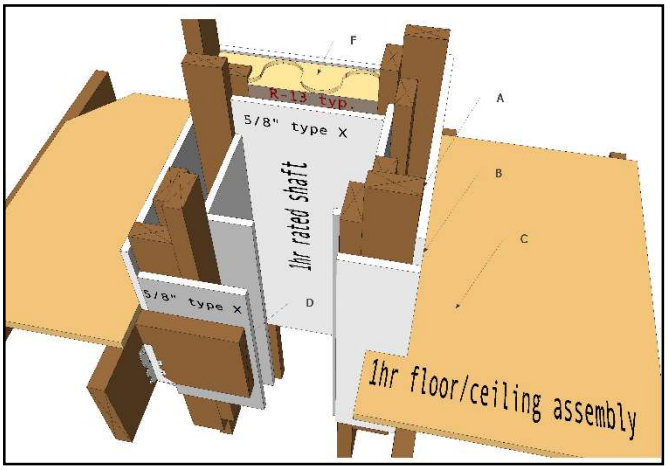
FIRE RATED SEPARATIONS

Prior to this inspection, all required sequential inspections and correction notices must be completed.
This is not an all-inclusive list and additional items may be required as determined during the inspection.

Group U private Garage Separation OMC 15.04.3.25.010	
☐	Dwelling units in two-family dwellings shall be separated from each other, and from adjoining spaces, by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.3 of the California Building Code
☐	No window openings on separation wall
☐	Door is a minimum 1⅜ inches thick solid core wood or solid or honey comb core steel door or (20-minute fire-rated door)
☐	Doors are tight-fitting, self-closing, and self latching
☐	Door does not connect with a sleeping room
☐	Ducts in the garage and ducts penetrating the walls or ceilings separating the *dwelling* from the garage are constructed of a minimum No. 26 gage sheet steel or other *approved* material and shall have no openings into the garage.
Group U private carport OMC 15.04.602	
☐	Separation not required if carport is entirely open on two or more sides and there are no enclosed areas above.
☐	Door is a minimum 1⅜ inches thick solid core wood or solid or honey comb core steel door
☐	Doors shall be tight-fitting, self-closing, and self latching
☐	Window openings are fixed (non-openable) and dual-pane tempered glazing.
☐	Door and window openings do not connect with a sleeping room.
Under-stair protection OMC 5.04.1015	
☐	Enclosed accessible space under stairs shall have walls, under-stair surface and any soffits protected on the enclosed side with ⅝-inch Type-X gypsum board.
Walls and Horizontal Separations	
☐	Walls separating dwelling units within the same building require a fire-resistance rating of not less than 1hr.
☐	Walls separating dwelling units within the same building require a sound transmission control rating (STC) of not less than 50.
	Example of approved wall 
☐	Fire separations extend from the top of the foundation to the underside of the roof sheathing
☐	Floor/ceiling assemblies separating dwelling units within the same building require a fire-resistance rating of not less than 1hr.
☐	Floor/ceiling assemblies separating dwelling units within the same building require a sound transmission control rating (STC) of not less than 50.

	Example of approved assembly.	
Penetrations of fire rated assemblies		
WALLS		
☐	For through penetrations of steel, ferrous, copper pipes, tubes or conduits; annular space is filled with listed firestop system	
☐	Membrane penetrations for electrical steel boxes (or other listed) that do not exceed 16sq in. total penetration area does not exceed 100sq in. in any 100sq ft. of wall.	
☐	Annular space between the membrane and box is not over 1/8 inch.	
☐	Boxes in opposite side of wall are separated horizontally at least 24 inches	
☐	Boxes not separated 24 inches have listed fire putty pads installed (or other approved method)	
FLOOR/ CEILING ASSEMBLIES		
☐	For through penetrations of steel, ferrous, copper pipes, tubes or conduits; annular space is filled with listed firestop system	
☐	Through penetrations of steel, ferrous, copper pipes, tubes or vents; annular space is filled with listed firestop system and the aggregate area does not exceed 144sq in. in any 100sq ft. of floor area.	
☐	Membrane penetrations of steel, ferrous, copper pipes, tubes or vents; annular space is filled with listed firestop system and the aggregate area does not exceed 100sq in. in any 100sq ft. of floor area.	
☐	Membrane penetrations for electrical steel boxes (or other listed) that do not exceed 16sq in. total penetration area does not exceed 100sq in. in any 100sq ft. of ceiling area.	
Shaft Enclosures		
☐	For other penetrations of a floor/ceiling assembly than those allowed. Shafts or approved alternatives are provided.	
☐	Shafts are constructed to *continuously* extend from the protected assembly, through the adjacent residential unit and terminate underside of the roof sheathing.	
1 HR RATED SHAFT		

legend	description
A	Shaft frame- 2x4 DF, (*sample represents a 16 inch exterior dimension shaft*). Or, if other is used (i.e. steel studs) the construction, must meet approved design per Gypsum Association Fire Resistive Manual.
B	5/8 inch type X gypsum on both side of shaft. Gypsum is installed uninterrupted along the entire length of the shaft, joints and screws are fire taped or fire caulked. Fastening per approved design per Gypsum Association Fire Resistive Manual.
C	Floor side of assembly
D	Floor framing (note: gypsum is not broken by framing
F	R-13 insulation typical



☐	Bathroom fans and environmental ducts installed within the protected floor ceiling assembly must install fire rated ducts and 1HR fire rated equipment.

SMOKE AND CARBON MONOXIDE DETECTORS

CRC R314 SMOKE ALARMS		
☐	A smoke detector, approved and listed by the State Fire Marshal pursuant to Section 13114, shall be installed, in accordance with the manufacturer's instructions in each dwelling intended for human occupancy within the earliest applicable time period as follows:	
	1	For all dwelling units intended for human occupancy, upon the owner's application on or after January 1, 1985, for a permit for alterations, repairs, or additions, exceeding one thousand dollars ($1,000).
NOTE	*All homes in the state are REQUIRED to comply. The building permit is the trigger for inspection.*	
☐	Where a household fire warning system is installed using a combination of smoke detector and audible notification device (s), it shall become a permanent fixture of the occupancy and owned by the homeowner.	
	Smoke alarms shall be installed in the following locations:	
	1	In each sleeping room.
	2	Outside each separate sleeping area in the immediate vicinity of the bedrooms.
	3	On each additional story of the dwelling, including basements and habitable attics but no including crawl spaces and uninhabitable attics. In dwellings with split levels and without intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that lower level is less than one full story below the upper level.
☐	When more than one smoke alarm is required to be installed within an individual dwelling ur alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit.	
☐	Alterations, repairs and additions. When alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.	
☐	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 shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for over-current protection. Exceptions:	
	1	Smoke alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.
	2	Smoke alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
	3	Smoke alarms are permitted to be solely battery operated in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.
☐	Where more than one smoke alarm is required to be installed within an individual dwelling or sleeping unit, the smoke alarms shall be **interconnected** in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. The alarm shall	

	be clearly audible in all bedrooms over background noise levels with all intervening doors closed. Exceptions:	
	1	Interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind.
	2	Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.
CRC R315 CARBON MONOXIDE ALARMS		
☐	For new construction an approved carbon monoxide alarm shall be installed in dwelling units and sleeping units within which fuel-burning appliances are installed and in dwelling units that have attached garages. Carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions	
☐	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. Alarm wiring shall be directly connected to the permanent building wiring without a disconnecting switch other than as required for over-current protection. **Exceptions:**	
	1	In dwelling units where there is no commercial power supply carbon monoxide alarms may be solely battery operated
	2	Other power sources recognized for use by NFPA 720
☐	Where more than one carbon monoxide alarm is required to be installed within the dwelling unit or within a sleeping unit the alarm shall be interconnected in a manner that activation of one alarm shall activate all of the alarms in the individual unit.	
☐	Carbon monoxide alarms required by Section R315.1 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	On every level of a dwelling unit including basements
☐	Where a permit is required for alterations, repairs or additions with a total cost or calculated valuation exceeding one thousand dollars ($1,000), existing dwellings or sleeping units with a fossil burning heater or appliance, fireplace or an attached garage shall have a carbon monoxide alarm in accordance with Section R315.2. Carbon monoxide alarms shall only be required in the specific dwelling unit or sleeping unit for which the permit was obtained.	
☐	**R315.2.3.1 Carbon monoxide alarms on or after July 1 2011.** Carbon monoxide alarms shall be installed in accordance with section R315.2 in **existing detached single-family dwelling or sleeping units** intended for human occupancy that have a fossil fuel-burning heater or appliance, fireplace or an attached garage. Carbon monoxide alarms in existing buildings are permitted to be solely battery operated or plug-in type with battery back-up in areas where no construction, is taking place.	
NOTE	*All homes in the state are REQUIRED to comply. The building permit is the trigger for inspection.*	
☐	**R315.2.3.2 Carbon monoxide alarms on or after January 1 2013.** Carbon monoxide alarms shall be installed in accordance with section R315.2 in all **other existing dwelling or sleeping units** intended for human occupancy that have a fossil fuel-burning heater or appliance, fireplace or an attached garage. Carbon monoxide	

	alarms in existing buildings are permitted to be solely battery operated or plug-in type with battery back-up in areas where no construction, is taking place.
NOTE	*All sleeping units (hotels etc) in the state are REQUIRED to comply. The building permit is the trigger for inspection.*
☐	**Power supply**. same as smoke detector
☐	**Interconnection**. same as smoke detector

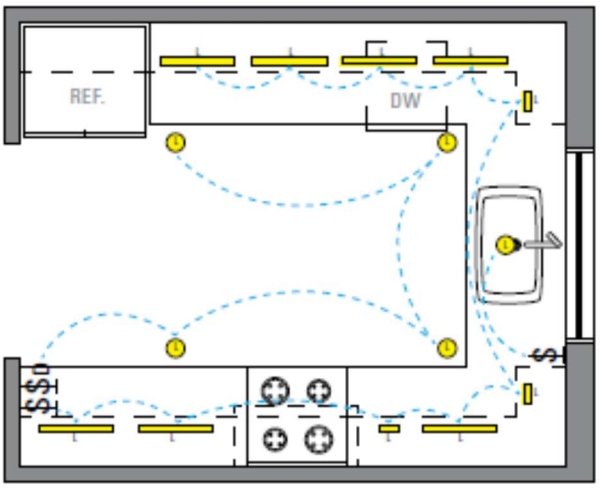
RESIDENTIAL KITCHEN LIGHTING STANDARDS

- Prior to this inspection, all required sequential inspections and correction notices must be completed.
- This is not an all-inclusive list and additional items may be required as determined during the inspection.

☐	All high-efficacy lighting is controlled separately from low-efficacy lighting.			
☐	Lighting provided is High Efficacy OR At least 50% of the total wattage is high efficacy (Additional low efficacy wattage may be installed according to unit floor area)			
	a	≤ 2,500 ft2 Up to 50 additional watts		
	b	> 2,500 ft2 Up to 100 additional watts		
	IF	1	*All low efficacy luminaries in kitchens must be controlled by a manual-on occupancy sensor, dimmer, EMCS, or multi-scene programmable control,* **AND**	
		2	*All luminaries in garages, laundries, closets > 70 ft², utility rooms must be high efficacy and controlled by manual-on occupancy sensors.*	
☐	Lighting Installed **inside cabinets** only for the purpose of illuminating the **inside** of cabinets is NOT considered part of the kitchen lighting for calculating the 50% high to low efficacy ratio. Lighting internal to cabinets is limited to 20 watts per linear foot of cabinet.			
☐	Blank electrical boxes in kitchens shall be calculated and treated as 180 watts of low efficacy lighting.			
	Recessed fixtures in applications between conditioned & unconditioned spaces shall meet these requirements:			
	a	Approved for IC (insulation contact) & label certifying AT (air tight) according to ASTM E283.		
	b	All air leak paths through luminaire assembly or ceiling must be sealed.		
☐	If a fixture can accept various lamp wattages, its wattage for the sake of code compliance is the highest re-lamping rated wattage designated by the manufacturer on a permanent, factory installed Underwriters Laboratory (UL) label (peel-off labels are not permitted).			
☐	A GU-24 lamp, in order to be considered High efficacy, MUST be rated for use only with high efficacy lamps or a high efficacy LED lighting source system. It does not contain any other type of line-voltage socket or lamp holder, and it cannot have an adaptor.			
☐	A compact fluorescent bulb on a medium screw-base socket fixture is NOT high efficacy.			
☐	In order for an LED luminaire to be considered High-efficacy, its must be certified to the Energy Commission.			
☐	Nook lighting must be on a separate switch in order to be counted as an "other space" and not part of the kitchen.			
	note	Pantries less than 70 square feet have no lighting or control requirements.		

STANDARD KITCHEN LIGHTING PLAN

148 square feet



KITCHEN LIGHTING TIPS

1. Light the countertops more than the walkway.
2. Provide lighting where it will support specific tasks and overall function of the space.
3. Provide a recessed can above the sink on a separate switch.
4. Supplement recessed can lighting with high-efficacy undercabinet light fixtures on separate switches.
5. The Illuminating Engineering Society recommends kitchen designs to achieve at least 30 footcandles on most kitchen counters and work surfaces.

STANDARD KITCHEN LIGHTING FIXTURE LEGEND

Symbol	Description	Lamp Type	Qty.	Watts	Total Watts	Efficacy (lm / W)
L	Recessed downlight	GU-24 base LED	5	12	**60**	**56**
L	1-light undercabinet fixture	LED *	3	4	**12**	**32**
L	3-light undercabinet fixture	LED *	7	9	**63**	**40**
$	Switch					
$D	Dimmer switch					

LED watts: 135 **At least 50% high-efficacy watts? Yes**

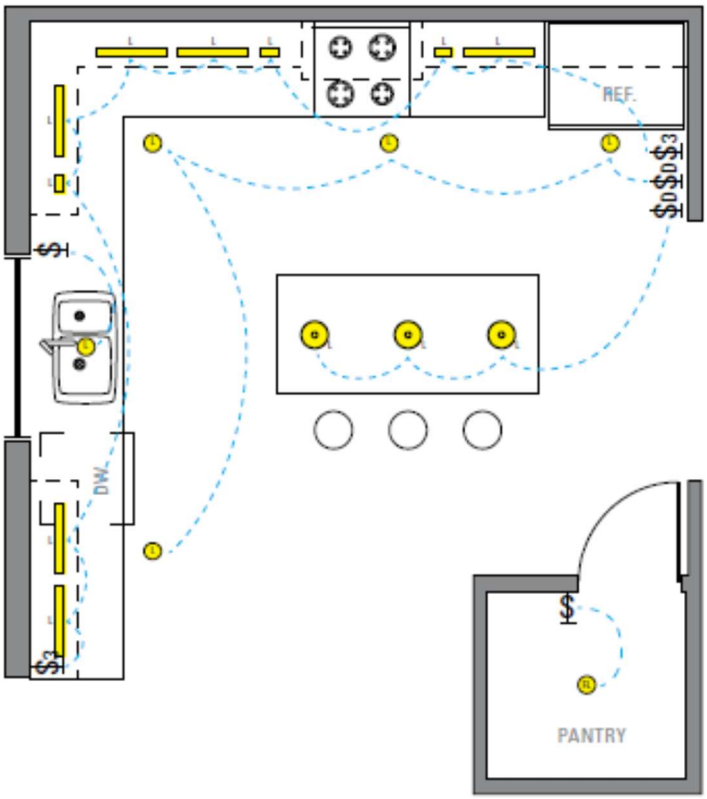
* **Note:** To be *Title 24, Part 6*-compliant, the LED luminaires (or at least half the wattage used by the LED luminaires) would need to be certified to the Energy Commission.

MODEL KITCHEN LIGHTING PLAN

289 square feet

KITCHEN LIGHTING TIPS

1. Use aesthetically pleasing light fixtures to complement the design of the kitchen.
2. Minimize the number of fixtures extending below the ceiling to reduce visual clutter.
3. Provide separate switches for versatility in the lighting environment.
4. Provide a three-way switch for the recessed cans with switches located at both entry points of the room.
5. Pantries less than 70 ft² are not regulated by *Title 24, Part 6*.
6. Locate recessed cans at the edge of the counter to reduce shadows that may be caused by the occupant.
7. Supplement recessed cans with high-efficacy undercabinet light fixtures on separate switches.



MODEL KITCHEN LIGHTING FIXTURE LEGEND

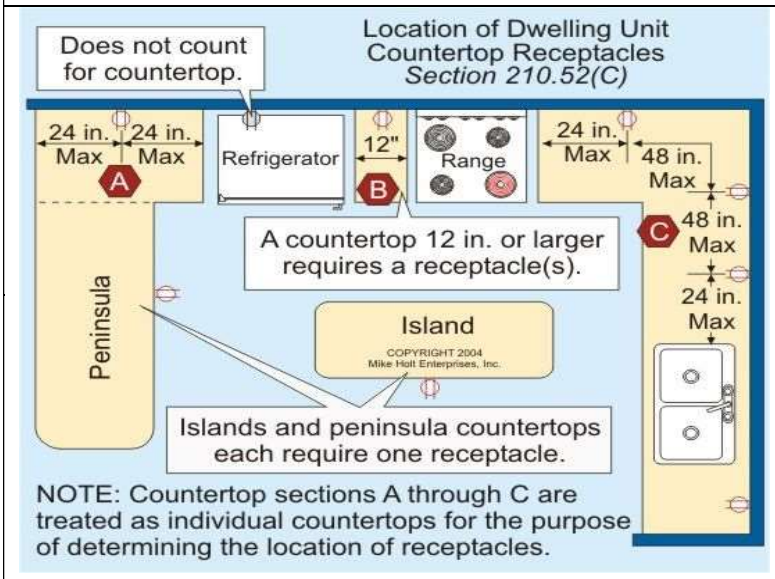
Symbol	Description	Lamp Type	Qty.	Watts	Total Watts	Efficacy (lm / W)
L	Recessed downlight	GU-24 base LED	5	12	**60**	**56**
FL	Flush mount faux recessed	GU-24 base CFL	1	26	**26**	**69**
L	1-light undercabinet fixture	LED	3	4	**12**	**32**
L	3-light undercabinet fixture	LED	6	9	**54**	**40**
L	Pendant	LED	3	8	**24**	**15**
$	Switch					
$D	Dimmer switch					
$3	3-way switch					

LED watts: 150
Fluorescent watts: 26
Total wattage: 176
At least 50% high-efficacy? Yes

RESIDENTIAL KITCHEN RECEPTACLES

- This is not an all-inclusive list and additional items may be required as determined during the inspection

1)	Two 20-ampere branch circuits shall supply kitchen countertop receptacles minimum.
2)	Wall Counter Spaces (See Figure 1):



a	A receptacle is installed for any counter that is 12 inches wide or greater; and,
b	No point on the kitchen counter, measured at the wall is more that 24 inches away from a receptacle.

Location of Dwelling Unit Countertop Receptacles CEC 210.52 (C)

3)	Island and Peninsular Counter Spaces (See Figure 2):
a	At least one receptacle is installed for an island or peninsular counter with dimensions of at least 24 inches by 12 inches;
b	An island counter with a rangetop or sink installed where the dimension behind the rangetop or sink to the edge of the counter is less than 12 inches is considered as two separate island countertops; and,
c	A peninsular countertop is measured from the connecting edge.

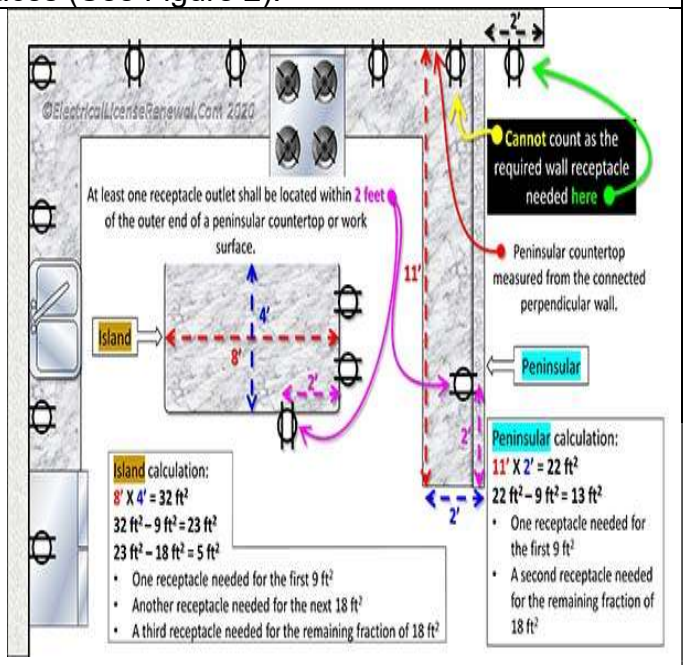


Figure 2

4)	Countertops separated by sinks, ranges, or refrigerators shall be treated as separate spaces. The wall behind the sink or cook top is not to be treated as wall space unless the distance exceeds 12 inches to the wall or 18 inches to a corner (See Figures 3 and 4).

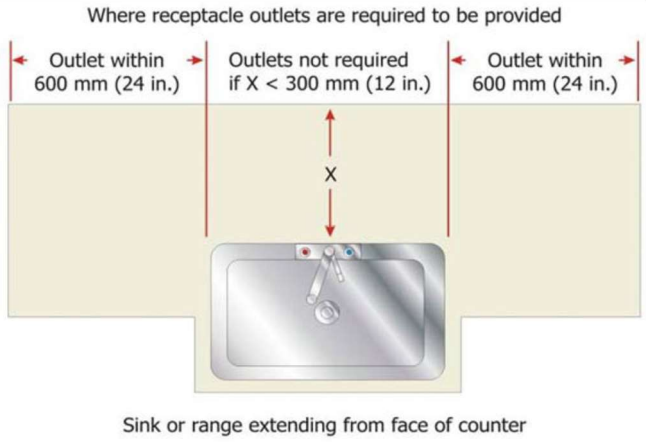


Figure 3

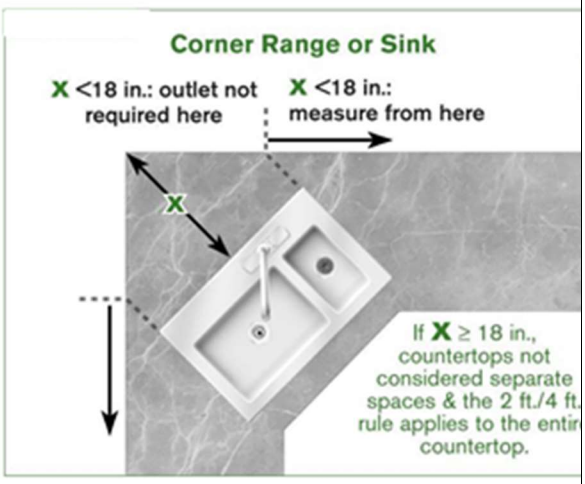


Figure 4

5)	Receptacle installation (See Figure 5):	
	a	Maximum of 20 inches above countertop;
	b	Maximum of 12 below island or peninsular countertops;
	c	Island or peninsular countertops may not extend more than 6 inches beyond the cabinet housing the receptacle; and,
	d	Receptacle may not be installed face-up in the countertop.

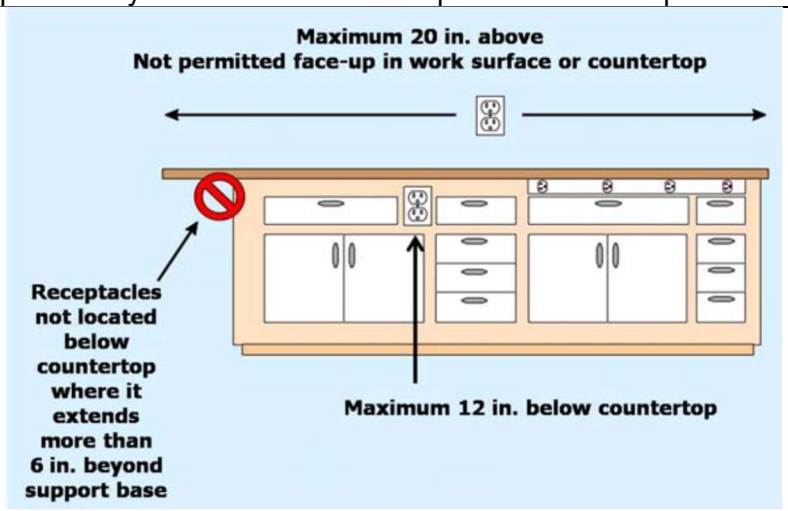
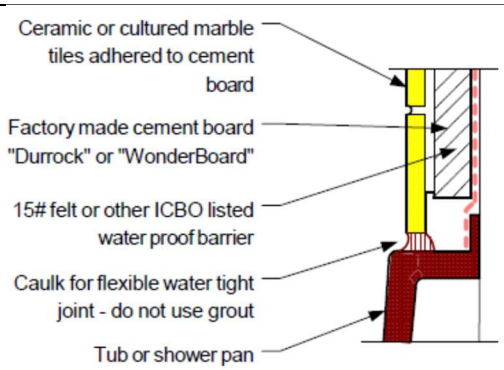
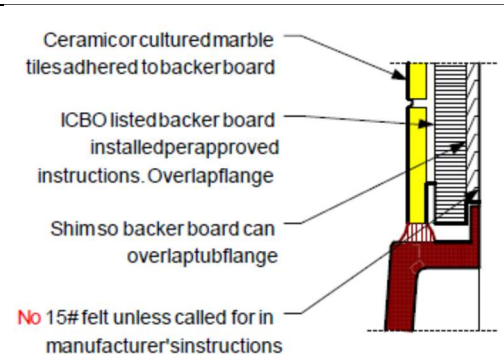
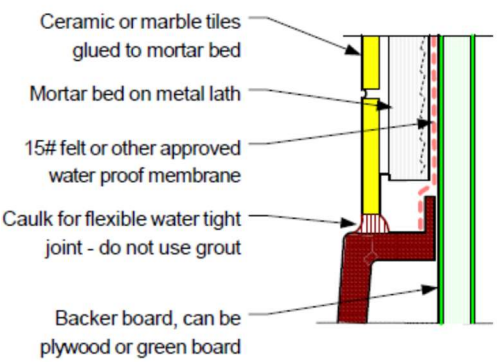


Figure5

6)	Ground-Fault Circuit-Interrupter (GFCI) protection is required for all receptacles serving kitchen countertops, as well as pantries, breakfast rooms and similar areas.

This summary guide does not cover all possible bathroom designs. The requirements listed are the minimum standards for issuance of the building permit and the inspections of the work.

Building Requirements

☐	**Gypsum Board in Showers and Water Closets**	
	Materials used as base for wall tile tub/shower shall be listed Table R702.4.2 and installed per AMI Glass mat gypsum backing installed per ASTM C1178 Fiber-cement backer board installed per ASTM C1288 Fiber mat cement backer installed to meet ASTM C1288 .	
☐	**Gypsum Board in Water Closet Compartments**	
	Water-resistant gypsum backing board shall be used as a base for tile in water closet compartment walls, installed in accordance with manufacturers recommendations	
	Tile over mortar	
☐	**Water-resistant Gypsum Backing Board Limitations: PURPLE OR GREEN BOARD CANNOT BE INSTALLED IF ANY OF THE BELOW IS TRUE**	
	a	Over a class 1 or class 2 vapor retarder in shower or bathroom compartment
	b	Where there will be direct exposure to water or in areas subject to continuous high humidity such as steam room or sauna room.
	c	On ceilings where frame spacing exceeds 12 inches on center for ½" thick water-resistant gypsum board or more than 16 inches on center for 5/8" thick water-resistant gypsum board.
☐	Regular gypsum board is permitted under tile or wall panel in other wall and ceiling areas.	

☐	Glass used in tub or shower enclosures (i.e. tub or shower door) or partitions must be tempered or an approved equal and must be permanently marked as such.	
☐	Any glazing (i.e. windows or doors) whose bottom edge is less than 18" above the floor must be tempered glass or approved equivalent.	
☐	Bathrooms and toilet compartments may have a ceiling height of not less than 6'-8" feet measured to the lowest projection from the ceiling. CRC R305	
☐	**Marble Finish**	
	a	No building paper on stud face
	b	Water-resistant gypsum backing board with nailing inspection required.
	c	Glued-on marble or marble equivalent
☐	**Thin set and Glue-on Tile**	
	a	Building paper on stud face
	b	Cementitious backer unit (CBU) installed in accordance with manufacturer's instructions. Instructions on jobsite at time of inspection.
	c	Tile (thinset or glue-on).
	d	Finish grout.
☐	**Tile**	
	a	No building paper on stud face.
	b	Water-resistant gypsum backer board
	c	Paper/lath with inspection required
	d	Scratch coat
	e	Tile installation
	d	Finish grout.
☐	**Fiberglass kits**	
	(does not include solid one-piece units) which have been approved by I.A.P.M.O. (or other approved testing and listing agency) for use in tub/shower walls.	
	a	No building paper on stud face.
	b	Water-resistant gypsum backer board with inspection required.
	c	Fiberglass kit installation per manufacturer's instructions with instructions available to inspector on the jobsite

SINGLE DRAIN SHOWER RECEPTOR

1	Walls within shower area constructed as wet walls
2	Required 2” measured from top of level floor to top of drain
3	Permanent receptor separation is required
4	Plans are required for approval of alterations to floor framing system.
5	Construction must comply with all other applicable Codes and Regulations.

JR

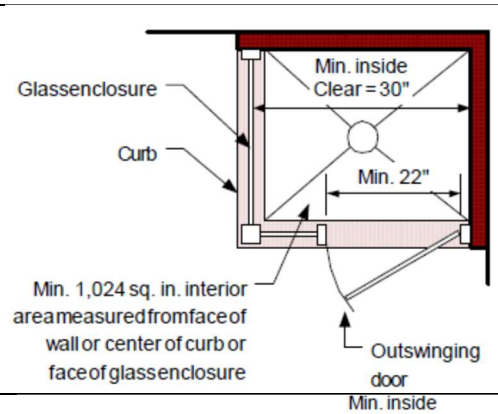
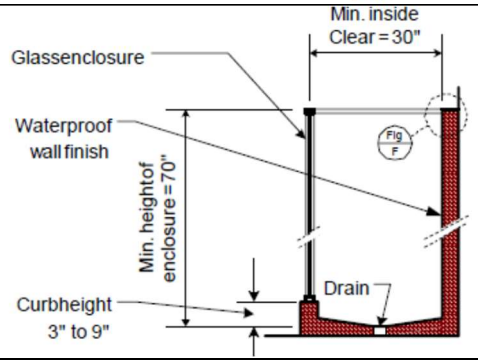
DOUBLE DRAIN SHOWER COMPARTMENT

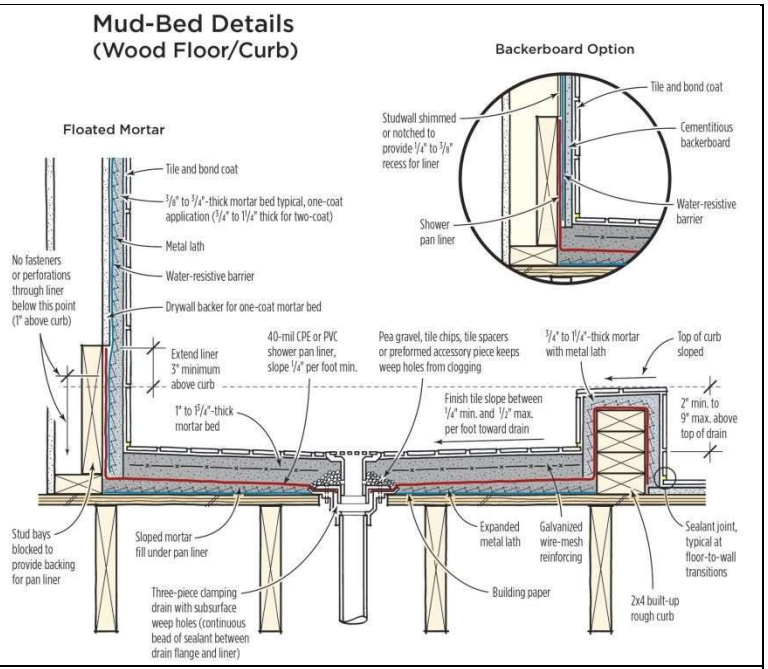
1	2 drain system required for shower compartments where a minimum 1/4" slope required cannot be achieved
2	Access to shower shall be minimum of 22”
3	Secondary Drain shall be as per width of opening
4	Secondary drain trap requires trap primer
5	Secondary trap must be connected to drain downstream of primary trap
6	Both traps are separately vented below the floor
7	Walls within shower area constructed as wet walls. Minimum of 6” membrane curb at wall.
8	Plans are required for approval of alterations to floor framing system.
9	Construction must comply with all other applicable Codes and Regulations.

ENTIRE BATH AS A SHOWER COMPARTMENT

1	Wall mount toilet
2	Wall mount vanity
3	All walls constructed as shower (wet walls)
4	Required 2” measured from floor at door to top of drain
5	GFCI outlet protected from direct water exposure
6	All electrical devices to comply with CEC requirements for wet locations and meet Energy Code requirements.
7	Exhaust fan and lighting switches located outside the bathroom
8	All luminaires to be high efficiency
9	Plans are required for approval of alterations to floor framing system.

Plumbing Requirements

☐	Shower Drain & Trap 2 inches minimum.		
☐	Shower Compartments		
☐	a	Minimum interior of 1024 square inches.	
☐	b	Minimum dimensions so a 30-inch circle will fit in the compartment.	
☐	c	Minimum height above floor drain is 70 inches.	
			Minimum shower dimensions
☐	d	Shower doors shall open to provide a minimum of 22 inches unobstructed egress opening	
☐	c	Neo-angle showers minimum 37 inch sides	
☐	A minimum space of at least 24” is provided in front of toilet or bidet.		
☐	A minimum space of at least 15” is provided from the center to any side obstruction		

	Site Built Shower Pan (Receptors)	
☐	a	Over slab, shall be water tight, constructed with approved materials, reinforced and with an approved flange floor drain. Lining to be pitched ¼" per foot to weep holes in drain.
☐	b	Over wood frame, water tight lining with minimum of 3 inches above finished dam, curb or threshold height. In no case shall any dam or threshold be less than 2 inches or more than 9 inches in depth when measured from the top of the dam or threshold to the top of the drain.

Electrical Requirement

☐	At least one receptacle must be installed within a residential bathroom within 3 feet of the sink and (See Figure 1):	
	a	On the wall adjacent to the sink; or,
	b	On the side or face of the sink cabinet.
☐	Bathroom receptacles shall be installed on a 20-ampere branch circuit that is (See Figure 2):	
	a	Dedicated to only bathroom receptacles; or,
	b	Dedicated to the receptacles and lighting within a single bathroom only.
☐	Ground-Fault Circuit-Interrupter protection is required for all bathroom receptacles.	
☐	Receptacles may not be installed within or directly over a bathtub or shower stall (See Figure 3).	

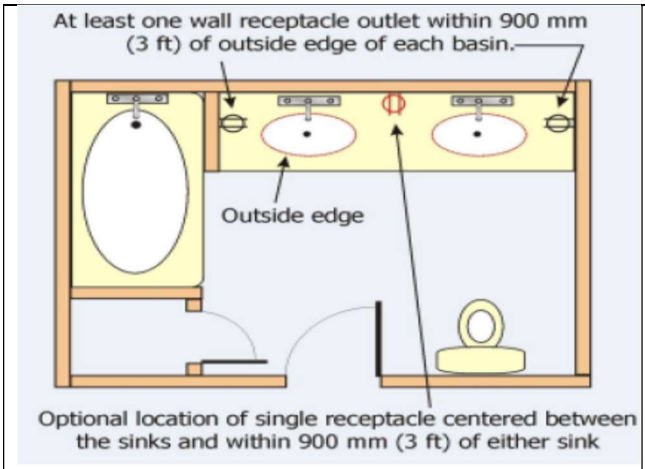


Figure 1

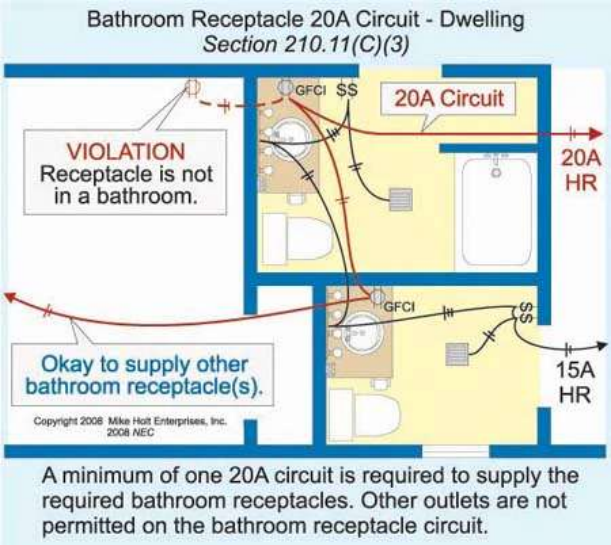


Figure 2

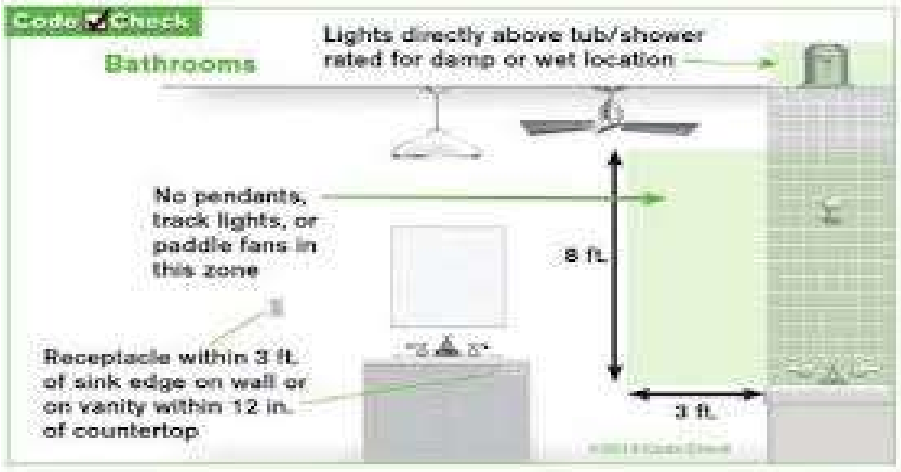


Figure 3

A)	Fixtures installed within the designated zone must be approved for wet locations.

RESIDENTIAL ENERGY CODE COMPLIANCE

What are the Compliance Pathways?

In California's 2019 Building Energy Efficiency Standards (Energy Code or Title 24, Part 6),

there are two parallel Prescriptive paths for compliance for low-rise residential buildings: mixed-fuel and all-electric. The mixed-fuel pathway is the route most of us are familiar with. It assumes natural gas or propane as an energy source as well as electricity for water heating and space heating. The all-electric pathway is a compliance option that no longer penalizes projects for using only electricity as an energy source for water heating and space heating. This all-electric option can be achieved by using heat-pump space and water heating along with other energy efficiency measures in new single-family and low- rise multifamily buildings, as well as low-rise residential Additions and Alterations.

Why are there two pathways in the Energy Code?

In order, to assist the State of California meet its goal of reducing carbon emissions by

80% compared to 1990 levels by 2050, the Energy Code now allows for an all-electric pathway for compliance in addition to the existing mixed-fuel pathway. Doing so will allow California to take advantage of its success developing photovoltaic (PV) systems as a carbon-free energy source, while continuing to offer the flexibility of mixed-fuel options.

There also are municipalities that are requiring projects to use the all-electric pathway for compliance as part of their Reach Codes. For more information and a comprehensive list of approved local ordinances, please visit localenergycodes.com.

Relevant Energy Code Sections

2019 California Building Energy Efficiency Standards, Title 24, Part 6:

• Section 110.0 – General Systems and Equipment

• Section 110.1 – Mandatory Requirements for Appliances

• Section 110.2 – Mandatory Requirements for Space-conditioning Equipment

• Section 110.3 – Mandatory Requirements for Service Water-heating Systems and Equipment

• Section 110.5 – Natural Gas Central Furnaces, Cooking Equipment, Pool And Spa

Heaters, and Fireplaces: Pilot Lights Prohibited

• Section 110.10 – Mandatory Requirements for Solar Ready Buildings

• Section 150.0(h) – Mandatory Requirements for Space-Conditioning Equipment

• Section 150.0(i) – Mandatory Requirements for Thermostats

• Section 150.0(j) – Mandatory Requirements for Insulation for Piping and Tanks

• Section 150.0(m) – Mandatory Requirements for Air-Distribution and Ventilation

System Ducts, Plenums, and Fans

• Section 150.0(n) – Mandatory Requirements for Water Heating Systems

• Section 150.0(o) – Mandatory Requirements for Ventilation and Indoor Air Quality

• Section 150.1(a) – Basic Requirements for Low-Rise Residential Buildings

• Section 150.1(b) – Performance Approach for Low-Rise Residential Buildings

• Section 150.1(c) – Prescriptive Approach for Low-Rise Residential Buildings

Compliance Pathways

Mandatory Measures

Mandatory measures must be met regardless of the compliance approach. For the

Mandatory requirements for HVAC and domestic hot water (DHW) systems, a design must comply with the requirements listed in Sections 110.0 - 110.3 and 150.0. These Mandatory measures include requirements for load calculations, controls, installation and testing.

Prescriptive Approach

The Prescriptive Approach is the more rigid pathway, in which each requirement must be met as a stand-alone feature, not allowing for Performance trade-offs between features. Prescriptive measures include requirements based on technology used and the project's Climate Zone. Minimum performance levels of HVAC and DHW equipment listed in

§150.1 and §150.2 cannot be traded off with other building components when pursuing the Prescriptive Approach. In the 2019 Energy Code, Tables 150.1-A and B now include

a Prescriptive heat pump water heating option along with heat pumps for space heating Climate Zone requirements in addition to existing gas equipment options for mixed-fuel homes.

Performance Approach

The Performance Approach is considered the most flexible compliance method. It can be used to analyze and demonstrate compliance for buildings that do not comply with the Prescriptive method. For this Approach in residential applications, the CF1R-PRF-01-E form is used document the fuel type used for HVAC systems and water heating. For both all-electric and mixed-fuel or gas systems, the Performance Approach allows trade-offs when Prescriptive requirements cannot be met and another system can make up the deficit, which allows the project to comply overall. To achieve compliance credit in the

Performance Approach, the proposed building must show Time Dependent Valuation (TDV) savings when compared to the Standard Reference Design as defined by the Residential Alternative Calculation Method (ACM) Reference Manual.

There is a Standard Reference Design for each all-electric, and mixed-fuel or gas fuel type. If the proposed building is all electric, it will be measured against an electric heat pump

for space heating and electric heat pump water heater for DHW. If the proposed building is mixed-fuel or gas, it will be measured against a gas furnace for space heating and an instantaneous gas water heater for DHW, as described in Table 1.

Table 2 provides a summary of compliance pathways by fuel source for building features in newly constructed residential buildings under the 2019 Energy Code.

Compliance Pathways for Features in Newly Constructed Buildings: 2019 Energy Code				
Building Feature	**Fuel Source**	**Mandatory**	**Prescriptive**	**Performance**
Heating	All Electric	**Sections 110.2 and 150.0** • Electric heat pump efficiency is dependent on the type, size and rating as shown in Table 110.2- B. • Ducted systems must meet duct insulation, HERS testing and MERV-13 filter requirements. • All heating or cooling systems not controlled by a central energy management control	**Section 150.1(c)** • System airflow rates need field verification and diagnostic testing in accordance with all applicable procedures specified in Residential Reference Appendix RA3.3 or an approved alternative procedure as specified by Residential Reference Appendix RA1. • Electric resistance heating is not allowed unless it is used as a supplemental heating unit in a space served directly or indirectly by a primary heating system, provided that the unit thermal capacity does not exceed 2 kW or 7,000 Btuh and is controlled by a time-limiting device not exceeding 30 minutes.	**Section 150.1(b)** • When Performance compliance requires installation of a heat pump system, the heating capacity values must be field verified as specified in Residential Reference Appendix RA3.4.4.2
	Mixed Fuel	**Sections 110.2 and 150.0** • Ducted systems must meet duct insulation, HERS testing and MERV-13 filter requirements. • All heating or cooling systems not controlled by an EMCS must have a setback thermostat.	**Section 150.1(c)** • System airflow rates need field verification and diagnostic testing in accordance with all applicable procedures specified in RA3.3 or an approved alternative procedure as specified by RA1.	**Section 150.1(b)** • There is compliance credit for using more efficient equipment than the minimum requirements.

Air Conditioning	All Electric	**Section 150.0(i)** • All heating or cooling systems not controlled by a central EMCS must have a setback thermostat. • Efficiency requirements are dictated by Table C-3 of Title 20, Section 1605.1(c) appliance efficiency regulations.	**Section 150.1(c)** • The system must have measurement access holes (MAH). • The system airflow rate must be confirmed through field verification and diagnostic testing either to be 250cfm per ton for small duct high velocity systems: or 350 cfm/ton for all other air-cool air conditioners and air-source heat pumps. • The installer must charge the system according to the manufacturer's specifications through one of the three following options: – The installer and HERS Rater perform the standard charge procedure as specified by Residential Reference Appendix RA3.2.2. – The system is equipped with a fault indicator display (FID) device that meets the specifications of Joint Reference Appendix JA6 and verified by the installer and HERS Rater. – The installer performs the weigh- in charging procedure as specified by Residential Reference Appendix RA3.2.3.1, and then it is verified by the HERS Rater	**Section 150.1(b)** • Air conditioners installed with higher- than-minimum efficiency ratings require a HERS Rater to verify ratings to receive compliance credit.
	Mixed Fuel	Not Applicable	Not Applicable	Not Applicable

Compliance Pathways for Features in Newly Constructed Buildings: 2019 Energy Code				
Building Feature	**Fuel Source**	**Mandatory**	**Prescriptive**	**Performance**
Water Heating	All Electric	**Sections 110.3 and 150.0(n)** • All applicable Mandatory requirements are listed in Sections 110.3 and 150.0(n). – Water heating recirculation loops serving multiple dwelling units must meet the requirements of Section 110.3(c)4 – 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. – Instantaneous water heaters with an input rating greater than 2kW must meet the requirements of Section 110.3(c)6.	**Section 150.1(c)** The water heating system cannot be electric resistance and must meet one of the following: • One Northwest Energy Efficiency Alliance (NEEA) Tier 3 or higher heat pump water heater located in the garage or conditioned space. Climate Zones 1 and 16 also must have a: – PV system sized 0.3kWdc larger than required in Section 150.1(c)14 OR – Compact hot water distribution system (HERS verified) • One heat pump water heater located inside the building (i.e., garage, dwelling, basement), plus: – A compact hot water distribution system (HERS verified) OR – In Climate Zones 2 -15, a PV system sized 0.3kWdc larger than required in Section 150.1(c)14 OR – In Climate Zones 1 and 16, a PV system sized 1.1kWdc larger than the required in Section 150.1(c)14.	• A large reduction in TDV savings will be associated with using electric resistance water heating. **Compliance credits:** • HERS-verified compact hot water distribution system (if not being used as an alternative to a gas tank system) • HERS-verified insulated hot water pipes (if not being used as an alternative to a gas tank system) • Solar hot water panels • Geothermal heat pump systems

Mixed Fuel	Section 150.0(n) For systems that use gas or propane to serve individual dwelling units, the following must be included: • A Category III or IV vent, or a Type B vent, with straight pipe between the outside termination and the space where the water heater is installed • A condensate drain that is no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance • A gas supply line with a capacity of at least 200,000 Btu/h • Systems using gas or propane water heaters to serve individual dwelling units must install electrical infrastructure including: – A dedicated 125 volt, 20 amp electrical receptacle that is connected to the electrical panel with a 120/240 volt 3 conductor, – 10 AWG copper branch circuit within 3 feet of the water heater and accessibility to it – Both ends of the unused conductor must	Section 150.1(c) A gas or propane water heating system that serves an individual dwelling unit must meet one of the following: • One or more gas or propane instantaneous water heaters with 200,000 Btu/h maximum input • One (1) 55 gallon or less storage gas or propane water heater with 75,000 Btu/h maximum input, plus installed fenestration products with a weighted average U-factor 0.24 maximum and one of the following: – Compact hot water distribution system (HERS verified) – Drain water heat recovery system (HERS verified) • For systems serving multiple dwelling units, a central water- heating system must meet the Executive Director Determination dated December 26, 2019 until a time in which additional Performance compliance options are made available by the Energy Commission.	**Compliance credits:** • High efficiency gas tankless system (exceeding Mandatory equipment efficiencies) • Combined hydronic DHW and space heating systems • Drain water heat recovery

Photovoltaics	All-Electric and Mixed-Fuel	**Section 150.1(c)14** • PV panels are required to meet orientation, shading, system monitoring and interconnection requirements.	**Section 150.1(c)14** • All low-rise residential buildings must have a photovoltaic (PV) system. – Minimum requirements in Joint Reference Appendix JA11 – Minimum sizing determined by Equation 150.1-C Exceptions are related to solar access, Climate Zones, dwelling units and battery storage systems.	**Section 150.1(b)** • If solar electricity is generated onsite, this can be deducted from the Total Energy Design Rating (EDR) which helps when reaching compliance. • If it is a community shared PV system, there are specific exemptions such as energy bill reduction or utility credits that will not

Additions and Alterations

For Additions, there are slight differences called out between the all-electric and mixed fuel pathways. Section 150.2(a)1D states that when adding a second water heater, the requirements of Section 150.1(c)8 must be followed per the water heater's fuel source. For Alterations, the 2019 Energy Code allows existing space heating systems that have natural gas or LPG as a fuel type to be replaced with a heat pump, as stated in the exceptions to Sections 150.2(b)1Cii and 150.2(b)1G. Per Section 150.2(b)1H, water heating systems must be one of the following: • Fueled by natural gas or propane if there is a gas connection OR • For Climate Zones 1-15, a single heat pump water heater OR • A consumer electric water heater if there is no gas connection OR • A water heating system that is determined by the Executive Director of the Energy Commission to use less energy than a gas or electric water heater If a single heat pump water heater is chosen and the project is in Climate Zones 1 - 15, the simplest way to comply with the Energy Code is to install a water heater that meets the NEEA Advanced Water Heater Specification Tier 3 or higher. If a heat pump water heater is selected that does not meet this specification, it must then be placed on an incompressible rigid insulated surface with a minimum R-value of R-10 and have a communication interface per Section 110.12(a). If a heat pump water heater is installed, the storage tank cannot be installed outdoors.

During Construction CF2R documents demonstrate installations are compliant with the Energy Code at the time of construction and should be submitted by the installer to the inspector. For projects requiring HERS verification, CF3R forms are completed by the HERS Rater and submitted to the inspector.

• CF3R-PLB-21-H: Certificate of Verification- HERS Multifamily Central Hot Water System Distribution

• CF3R-PLB-22-H: Certificate of Verification - HERS Single Dwelling Unit Hot Water System Distribution

• CF3R-MCH-25-H: Certificate of Verification - Rated Space Conditioning Equipment Verification

• CF3R-MCH-33-H: Certificate of Verification - Variable Capacity Heat Pump Compliance Credit

• CF2R-ADD-02-E: Certificate of Installation - Additions less than 1000 ft2

• CF2R- PVB-01-E: Certificate of Installation - Photovoltaic Systems

• CF2R- PVB-02-E: Certificate of Installation - Battery Storage Systems

• CF2R-MCH-25: Certificate of Installation - Refrigerant Charge

• CF2R-MCH-26: Certificate of Installation - Rated Space Conditioning Equipment

• CF2R-MCH-33: Certificate of Installation - Variable Capacity Heat Pump Compliance Credit

New Terms

• ALL-ELECTRIC BUILDING: a building that has no natural gas or propane plumbing installed within the building and that uses electricity as the source of energy for its space heating, water heating, cooking appliances, and clothes drying appliances.

• ELECTRIC RESISTANCE HEATING: the production of heat by passing electric current through a resistive element.

• HEAT PUMP: an appliance, that consists of one or more assemblies; that uses an indoor conditioning coil, a compressor and a refrigerant-to-outdoor air heat exchanger to provide air heating; and that may also provide air cooling, dehumidifying, humidifying, circulating, or air cleaning.

CalGREEN- RESIDENTIAL MANDATORY MEASURES CHESCKLIST

The 2019 CalGreen Code applies to additions or alterations of existing residential buildings where the addition or alteration increases the building's conditioned area, volume, or size and also applies to all new low-rise residential buildings, high-rise residential buildings, or both. Existing site and landscaping improvements that are not otherwise disturbed are not subject to the requirements of CALGreen.

Project Name: _____

Project Address: _____

Project Description: _____

Instructions:

1. The Owner or the Owner's agent shall employ a licensed professional experienced with the 2019 California Green Building Standards Codes to verify and assure that all required work described herein is properly planned and implemented in the project.
2. The licensed professional, in collaboration with the owner and the design professional shall initial **Column 2** of this checklist, sign and date **Section 1 - Design Verification** at the end of this checklist and have the checklist printed on the approved plans for the project.
3. Prior to final inspection by the Building Department, the licensed professional shall complete **Column 3** and sign and date **Section 2 - Implementation Verification** at the end of this checklist and submit the completed form to the Building Inspector.

MANDATORY FEATURE OR MEASURE	Project Requirements	Verification
A4.1 PLANNING AND DESIGN		
Planning and Design - Site Development		
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 shall manage storm water drainage during construction.	☐	☐
4.106.3 Grading and paving. The site shall be planned and developed to keep surface water away from buildings. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows.	☐	☐
4.106.4 Electric vehicle (EV) charging for new construction. New construction shall comply with Sections 4.106.4.1 and 4.106.4.2 to facilitate future installation and use of EV chargers.	☐	☐
A4.2 ENERGY EFFICIENCY		

General		
4.201.1 Low-rise residential buildings shall meet or exceed the minimum standard design required by the California Energy Standards.	☐	☐
A4.3 WATER EFFICIENCY AND CONSERVATION		
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 following: ☐ **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 Specifications for Tank-type Toilets. ☐ **4.303.1.2 Urinals.** The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush or 0.5 gallons for all other urinals. ☐ **4.303.1.3.1 Single Showerheads.** 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 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 allow only one shower outlet to be in operation at a time. ☐ **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.	☐	☐

4.303.2 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.	☐	☐
Outdoor Water Use		
4.304.1 Outdoor potable water use in landscape areas. New residential developments with an aggregate landscape area equal to or greater than 500 square feet shall comply with one of the following options: ☐ A local water efficient landscape ordinance or the current California Department of water Resources' Model Water Efficient Landscape Ordinance (MWELO), whichever is more stringent; or	☐	☐
☐ Projects with aggregate landscape areas less than 2,500 square feet may comply with the MWELO's Appendix D Prescription Compliance Option.		
A4.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY		
Enhanced Durability and Reduced Maintenance		
4.406.1 Rodent proofing. Annular spaces around pipes, electric cables, conduits, or other openings in plates at exterior walls shall be protected against the passage of rodents by closing such openings with cement mortar, concrete masonry or similar method acceptable to the enforcing agency.	☐	☐
Construction Waste Reduction, Disposal and Recycling		
4.408.2 Construction waste management plan. Where a local jurisdiction does not have a construction and demolition waste management ordinance, a construction waste management plan shall be submitted for approval to the enforcing agency. Minimum 65% mixed-waste recycling facility requires third party verified diversion rates.	☐	☐
Building Maintenance and Operation		
4.410.1 Operation and maintenance manual. At the time of final inspection, an operation and maintenance manual shall be provided to the building occupant or owner.	☐	☐

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 is identified for the depositing, storage and collection of non-hazardous material for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals, or meet a lawfully enacted local recycling ordinance, if more restrictive.	☐	☐
A4.5 ENVIRONMENTAL QUALITY		
Fireplaces		
4.503.1 General. Install only a direct-vent sealed-combustion gas fireplace. B.A.A.Q.M.D. does not allow indoor wood-burning fireplaces.	☐	☐
Pollutant Control		
4.504.1 Covering of duct openings and protection of mechanical equipment during construction. Duct openings and other related air distribution component openings shall be covered during construction.	☐	☐
4.504.2.1 Adhesives, sealants and caulks. Adhesives, sealants and caulks shall be compliant with VOC and other toxic compound limits (Table 4.504.1 & 4.504.2).	☐	☐
4.504.2.2 Paints and coatings. Paints, stains and other coatings shall be compliant with VOC limits (Table 4.504.3).	☐	☐
4.504.2.3 Aerosol paints and coatings. Aerosol paints and other coatings shall be compliant with product weighted MIR Limits for ROC and other toxic compounds. B.A.A.Q.M.D. has additional guidelines in Regulation 8, Rule 49.	☐	☐
4.504.2.4 Verification. Documentation shall be provided to verify that compliant VOC limit finish materials have been used.	☐	☐
4.504.3 Carpet Systems. Carpet and carpet systems shall be compliant with VOC limits.	☐	☐

4.504.4 Resilient flooring systems. At least eighty (80) percent of floor area receiving resilient flooring shall comply with the VOC-emission limits defined in the Collaborative for High Performance Schools (CHPS) Low- emitting Materials List or be certified under the Resilient Floor Covering Institute (RCFI) FloorScore program and UL GREENGUARD Gold.	☐	☐
4.504.5 Composite wood products. Particleboard, medium density fiberboard, and hardwood plywood used in interior or exterior finish systems shall comply with low formaldehyde emission standards (Table 4.504.5).	☐	☐
Interior Moisture Control		
4.505.2 Concrete slab foundation. Required vapor retarders and capillary breaks are also required to comply with CalGreen Section 4.505.2.1.	☐	☐
4.505.3 Moisture content of building materials. Moisture content (maximum 19%, minimum .3%) of building materials used in wall and floor framing is checked before enclosure .	☐	☐
Indoor Air Quality and Exhaust		
4.506.1 Bathroom exhaust fans. Exhaust fans must terminate outside the building and be provided in every bathroom with a shower, tub, or tub/shower (Energy Star compliant with humidity control or part of whole house ventilation	☐	☐
Environmental Comfort		
4.507.2. Heating and air-conditioning system design. HVAC systems shall be sized, designed and the equipment selected using the following methods: 1. Establish heat loss and heat gain values according to ANSI/ACCA 2 Manual J-2016 or other equivalent design methods. 2. Size duct systems according to ANSI/ACCA 1 Manual D-2016 or other equivalent design methods. 3. Select heating and cooling equipment according to ANSI/ACCA 3 Manual S-2014 or other equivalent design methods.	☐	☐
INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS		

Qualifications		
702.1 Installer training. HVAC system installers are trained and certified in the proper installation of HVAC systems.	☐	☐
702.2 Special inspection. The Licensed Professional responsible to verify CALGreen compliance is qualified and able to demonstrate competence in the discipline they inspect and verify.	☐	☐
Verifications		
703.1 Documentation. Verification of compliance with CALGreen may include construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which demonstrate substantial conformance. Implementation verification shall be submitted to the Building Department after implementation of all required measures and prior to final inspection approval.	☐	☐

CALGREEN SIGNATURE DECLARATIONS

Project Name: _____

Project Address: _____

Project Description: _____

SECTION 1 – DESIGN VERIFICATION

Complete all lines of Section 1 – "Design Verification" and submit the completed checklist (Columns 1 and 2) with the
plans and building permit application to the Building Department.

The owner and design professional responsible for compliance with CalGreen Standards have revised the plans and certify that the items checked above are hereby incorporated into the project plans and will be implemented into the project in accordance with the requirements set forth in the 2019 California Green Building Standards Code as adopted by the City of Oakland.

Owner's Signature Date

Owner's Name (Please Print)

Design Professional's SignatureDate

Design Professional's Name (Please Print)

Signature of License Professional responsible for CalGreen compliance Date

Name of License Professional responsible for CalGreen compliance (Please Print)Phone

Email Address for License Professional responsible for CalGreen compliance

SECTION 2 – IMPLEMENTATION VERIFICATION

Complete, sign and submit the competed checklist, including column 3, together with all original signatures on Section
2 to the Building Department prior to Building Department final inspection.

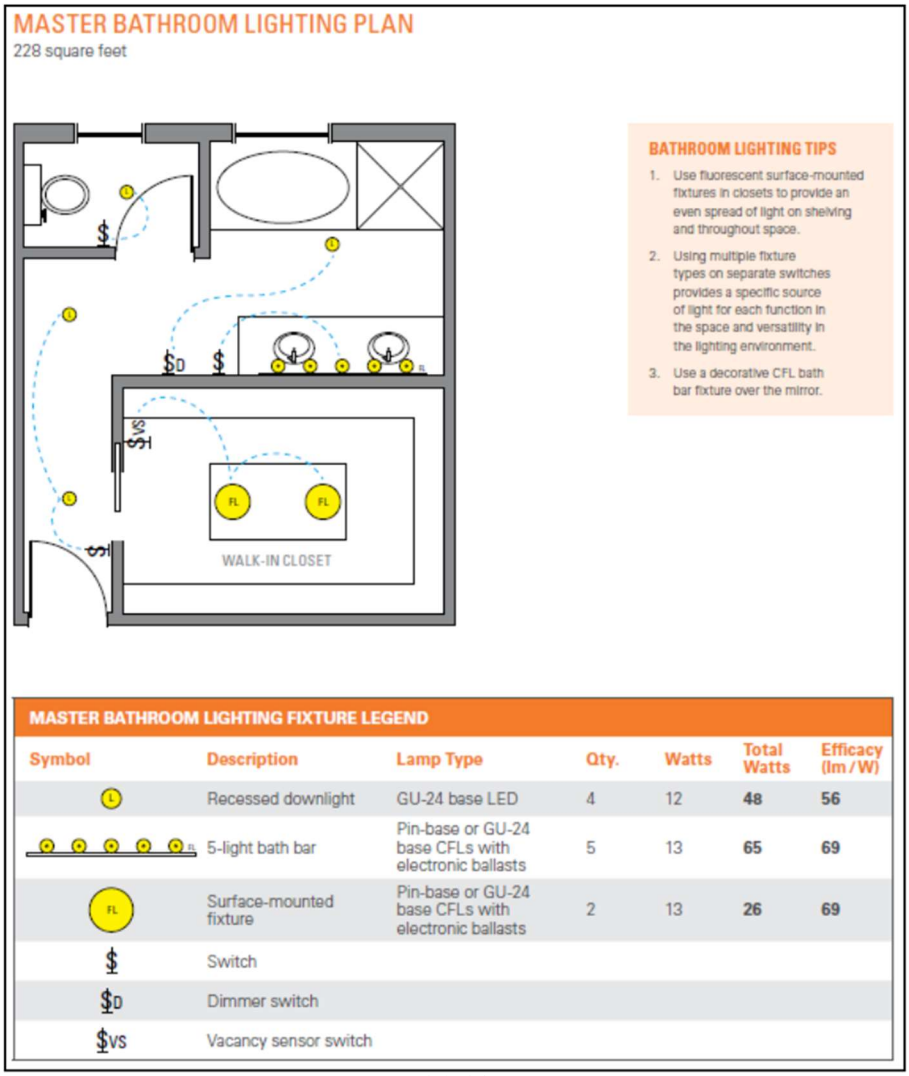
I have inspected the work and have received sufficient documentation to verify and certify that the project identified above was constructed in accordance with this Green Building Checklist and in accordance with the requirements of the 2019 California Green Building Standards Code as adopted by the City of Oakland.

Signature of License Professional responsible for CalGreen complianceDate

Name of License Professional responsible for CalGreen compliance (Please Print)Phone

Email Address for License Professional responsible for CalGreen compliance

	Permanently installed light fixture in bathrooms shall be High-efficacy luminaires. Low-efficacy luminaires are allowed if they are controlled by a manual-on occupancy sensor
	Occupancy sensor must be manual on/off and automatic off. The maximum time delay to turn off is 30 minutes after the last detected motion. Sensors cannot have an override allowing the light fixture to be continuously on.
	High-efficacy and Low-efficacy light fixtures must be controlled separately.
	Exhaust fans with integral lighting system shall be switches separately from lighting system OR have a lighting system that can be manually turned on and off while allowing the fan to continue to operate for an extended period of time. Lighting integral to an exhaust fan must be high-efficacy.
	Permanently installed night light must be high efficacy lighting OR the night light is rated to consume no more than 5 watts of power and does not contain a medium screw-base socket.



Sample bath layout

Bathroom Ventilation Requirements:

California Energy Code Section 150-(o)

Local Exhaust Ventilation in Bathrooms is required is mandated for all low-rise residential buildings (up to 3 stories) and additions greater than 1,000 square feet (original building must also comply) and for any addition and remodel when existing equipment is replaced. It

☐	Each bathroom has a 50 cfm minimum exhaust fan ducted to the outside. Unit must be humidity controlled with a sensor range <50% to max 80% Bathroom is any room with a bathtub, shower, spa or similar sources of moisture. *Toilet room is not considered a bathroom.*
☐	The ducting for the exhaust fan shall be sized according to ASHRAE Standard 62.2, Table 7.1 (see item D). *Flex duct shall not be used in range hood.*
☐	Local exhaust fans are required to be rated for sound at a maximum of 3 sones, unless their maximum rated airflow exceeds 400 cfm.

D. Prescriptive Duct Sizing Requirements (ASHRAE 62.2 Table 7.1)

Duct Type	Flex Duct				Smooth Duct			
Fan Rating (cfm @ 0.25 in w.c)	50	80	100	125	50	80	100	125
	Maximum Allowable Duct Length (ft)							
Diameter (in)	Flex Duct				Smooth Duct			
3	X	X	X	X	5	X	X	X
4	70	3	X	X	105	35	5	X
5	NL	70	35	20	NL	135	85	55
6	NL	NL	125	95	NL	NL	NL	145
7 & above	NL	NL	NL	NL	NL	NL	NL	NL
This table assumes no elbows. Deduct 15 ft. of allowable duct length for each turn, elbow or fitting.								
NL	=	No limit on duct length of this diameter						
X	=	Not allowed, any length of duct of this size with assumed turns, elbows, fittings will exceed the rated pressure drop.						
w.c	=	Water column						

REQUIRED INFORMATION ON PLANS

Notes should be provided on the plans that identify the local exhaust and whole house ventilation

LOCAL EXHAUST VENTILATION

Bathroom	☐	Specify bathroom fan flow (cfm): _____		
		Duct type:	☐ Flex duct	☐ Smooth duct
	☐	Duct diameter (in): _____		
	☐	Allowable Duct length (ft): _____		
	☐	Exhaust fan rated for sound at a maximum of 3 sones.		

GENERAL WATER HEATER REQUIREMENTS

Prior to this inspection, all required sequential inspections and correction notices must be completed. This is not an all-inclusive list and additional items may be required as determined during the inspection.

GENERAL WATER HEATER REQUIREMENTS CHECKLIST	
Permits required CPC 502.0	
Permits and documents on site	
15.04.3.25.015 - CRC Section R303.10 added. Add the following new Section R303.10 to the California Residential Code: "R303.10 Each tenant or owner shall have access to their own mechanical heating equipment and water heater. A central Mechanical Room is permitted provided that each tenant or owner has access without being compelled to pass through another unit."	
Domestic water heating system (New construction, addition, or alteration) shall include a dedicated 125v 20 amp receptacle within 3' of WH. Branch circuit shall be 10-3WG AWG cu. Both ends of unused conductor shall be isolated and labeled "spare". Reserve single Pole breaker space in panel labeled "Future 240V Use" adjacent to 20amp dedicated circuit breaker for WH Per CENGC 150.0(n)	
CF-6R-MECH-01 complete and on site	
Installation instructions available for inspection, and to remain with equipment.	
Gas-fired water heaters, which depend on the combustion of fuel for heat, shall not be installed in the following locations: CPC 504.1	
1. A room used or designed to be used for sleeping purposes,	
2. A bathroom,	
3. A clothes closet.	
Exception: Direct vent water heaters. CPC 504.1(2)	
Closet opening into a bathroom or bedroom shall be equipped with a listed, gasketed door assembly.	
Listed self closing device. (HOLD-OPEN FEATURE IS NOT ALLOWED)	
Door assembly shall be installed with a threshold and bottom door seal.	
Combustion air shall be only obtained from the outdoors.	
Closet shall be used for exclusive use of the furnace (NOT FOR STORAGE)	
Not installed in attic or other spaces where damage may result from a leaking water heater, without an approved safe pan beneath the water heater with a minimum ¾ inch drain to an approved, readily visible location. CPC 507.5	
Water heaters generating a glow, spark or flame capable of igniting flammable vapors may be installed in a garage, provided the pilots, burners or heating elements and switches are at least 18 inches above the floor. CPC 507.13	
Water heaters installed within a garage within an enclosed compartment having access only from outside of the garage, may be installed at floor level provided the required combustion air is also taken from the exterior.	
When water heaters are installed on a stand or platform base, the base shall be adequately anchored.	
Water heater Seismic Bracing located at points within the upper one-third and lower one-third of the water heaters vertical dimensions. At the lower point, a minimum distance of four inches is maintained above the controls with the strapping. The upper strap is installed nine inches below the top of the tank. CPC 507.2 CHSC 19211(a)	

A full bore shut off valve is required on cold water side	
Unions must be installed within 12 inch of water heater to facilitate removal	
Minimum ¾ inch T&P drain to terminate "outside" of the building no closer than 6 inches or further than 24 inches from grade. T&P line must be looking downward with no threads on the end. CPC 504.4 CPC 504.5 CPC 608.5 (1) through(7)	
T&P does not discharge into a water heater drain pan. CPC 608.5(7)	
Domestic Hot water piping shall be insulated. Min insulation thickness not less than diameter of piping up to 2" CPC 609.11.1 CPC 609.11.2 Insulation Min 1" thick in the following Locations. First 5' cold water pipe from storage tank. All piping ¾" to <1", All piping <¾ for (a) domestic hot water recirculation, (b) from heat source to kitchen fixtures.(c) from heat source to storage tank or between storage tanks. (d) buried below grade. CENGC 150.0 (j) 2 A	
Sediment trap (T, 3" nipple and cap) installed on gas supply CPC 1212.9	
Bonding Jumper installed between hot, cold and gas metallic piping at water heater location with a min. #8 bare copper for 100 amp service. #4 bare cu for 200 amp serice. Bonding jumper to be sized per CEC table 250.122 f	
Gas connectors sized for the BTU input rating of appliance. Does not exceed 3 feet in length and is connected downstream of approve shut of valve.	
Thermal expansion tank installed to protect water delivery system per CPC 608.2 & CMC 1004.1if a pressure regulator with an integral back flow preventor is installed on the main supply line	
Combustion air vents are unobstructed and located within 12" from top and bottom of any enclosure less than 50 c.f. per 1000 BTU per hour. Vent openings are sized to 1 sq-in per 4000 BTU Outdoor air. CPC 506.4 .1" per 1000 BTU indoor air CPC 506.3 of appliance(s) input capacity and protected with ¼" screen mesh	
Venting system sized and constructed per manufacture's specifications CPC 509.6.3	
Single wall vent connectors maintain 6" clearance to combustible materials, secured with 3 fasteners per end.	
Type B double wall vent piping installed to maintain 1" clearance to combustibles. Direction markings correct and locking ends fully engaged. (no fasteners required, and please no tape) CPC 509.10.12 Type B vent piping is required when penetrating walls, floors or ceiling assemblies.	
Listed Gas Vents 12" or less terminating not less than 8' from wall or obstruction shall not terminate less than 1' above flat roof to 6/12, additional height required if roof pitch is greater than 6:12 slope,CPC Table 509.6.1v Vent termination in all other cases not to terminate any less than 2 feet above any structure within 10 feet. Other venting rules may apply see section CPC 509.6.1	

SEISMIC STRAPPING	
Water Heater size	No. of straps
to -52 gallons	2
-75	3
-100	4

GENERAL TANKLESS WATER HEATER REQUIREMENTS

Prior to this inspection, all required sequential inspections and correction notices must be completed. This is not an all-inclusive list and additional items may be required as determined during the inspection.

GENERAL TANKLESS WATER HEATER REQUIREMENTS-CHECKLIST	
Permits required. Provide gas line sizing calculations and isometric riser diagram of the gas delivery piping system for the equipment with permit application. NOTE: waive calculations if a 3/4'" dedicated line is connected (split) at the main by up-sizing the meter tee. (up-seized tee example: install 1"x3/4"x3/4" tee for existing 3/4" building service) OAK	
Permits and documents on site	
15.04.3.25.015 - CRC Section R303.10 added. Add the following new Section R303.10 to the California Residential Code: "R303.10 Each tenant or owner shall have access to their own mechanical heating equipment and water heater. A central Mechanical Room is permitted provided that each tenant or owner has access without being compelled to pass through another unit."	
CF-6R-MECH-01 complete and on site	
Manufacturer specifications and Installation instructions available for inspection	
For exterior installations, equipment is located where approved by the Planning Division of the City of Oakland.	
Gas-fired water heaters, which depend on the combustion of fuel for heat, shall not be installed in the following locations: CPC 504.1 (1)	
1. A room used or designed to be used for sleeping purposes,	
2. A bathroom,	
3. A clothes closet,	
Exception: Direct vent water heaters. CPC 504.1(2)	
Closet shall be used for no other purpose and be equipped with a listed, gasketed door assembly.	
Listed self closing device. (HOLD-OPEN FEATURE IS NOT ALLOWED)	
Door assembly shall be installed with a threshold and bottom door seal.	
Combustion air shall be only obtained from the outdoors.	
Not installed in attic or other spaces where damage may result from a leaking water heater, without an approved safe pan beneath the water heater with a minimum ¾ inch drain to an approved, readily visible location. CPC 507.5	
Required access, clearances to combustibles and vent termination location per manufacturer's instructions.	
Combustion air vents are unobstructed and located within 12" from top and bottom of any enclosure less than 50 c.f. per 1000 BTU per hour. Vent openings are sized to 1 sq-in per 4000 BTU Outdoor air CPC 506.4 1' per 1000 BTU CPC 506.3 of appliance(s) input capacity and protected with ¼" screen mesh	
Minimum ¾ inch T&P drain to terminate "outside" of the building no closer than 6 inches or further than 24 inches from grade. T&P line must be looking downward with no threads on the end. CPC 504.4 CPC 504.5 CPC 608.5 (1)-(7)	
T&P does not discharge into a water heater drain pan. CPC 608.5 (7)	
Provide gas line sizing calculations and isometric riser diagram of the gas delivery piping system for the equipment with permit application. NOTE: waive calculations if a 3/4'" dedicated line is connected (split) at the main by up-sizing the meter tee. (up-seized tee example: install 1"x3/4"x3/4" tee for existing 3/4" building service) OAK	
Sediment trap (T, 3" nipple and cap) installed on gas supply CPC 1212.9	

Gas connectors sized for the BTU input rating of appliance. Does not exceed 3 feet in length and is connected downstream of approve shut of valve.	
Building gas piping test is under pressure not less than 10 lbs pressure for 15 minutes CPC 1213.3 . 30 lbs gauge maxi . for new and altered portions of gas delivery system.	
A full bore shut off valve is required on cold water side	
Unions must be installed within 12 inch of water heater to facilitate removal	
Domestic Hot water piping shall be insulated. Min insulation thickness not less than diameter of piping up to 2" CPC 609.11.1 CPC 609.11.2 Insulation Min 1" thick in the following Locations. First 5' cold water pipe from storage tank. All piping ¾" to <1", All piping <¾ for (a) domestic hot water recirculation, (b) from heat source to kitchen fixtures.(c) from heat source to storage tank or between storage tanks. (d) buried below grade. CENGC 150.0 (j) 2 For exterior installations insulating material is listed and approve to be exposed to weather)	
Thermal expansion tank installed to protect water delivery system per CPC 608.2 & CMC 1004.1 if a pressure regulator with an integral back flow preventer is installed on the domestic main supply line.	
Domestic water heating system (New construction, addition, or alteration) shall include a dedicated 125v 20 amp receptacle within 3' of WH. Branch circuit shall be 10-3WG AWG cu. Both ends of unused conductor shall be isolated and labeled "spare". Reserve single Pole breaker space in panel labeled "Future 240V Use" adjacent to 20amp dedicated circuit breaker for WH Per CENGC 150.0(n	
Attic or basement installations will require a 110/120 receptacle and switched luminary at or near the equipment. The switch for the luminary must be located adjacent to the attic or basement access.	
Bonding jumper installed between hot, cold and gas metallic piping at water heater location CEC 250.104 with a min. #8 bare copper for 100 amp service. #4 for service >200 amp Bonding jumper to be sized per CEC table 250.122	
All new electrical work requires an electric permit.	
Venting system sized and constructed per manufacture's specifications CPC 509.6.3	
Positive pressure (forced) vents comply with the vent manufacturer's installation instructions for Category III and IV appliances. Most are Stainless Steel due to the slightly acidic content of the condensate. Most do not allow common vent with other appliances. All positive pressure vent pipes shall be sealed air tight at each joint from flue collar to termination. Type B venting material is not acceptable for positive pressure vents.	
CPVC, PVC or ABS pipe vents installed per equipment manufacturer. Where required, primer should be of contrasting color. CPC 509.4.1 CMC 802.4.1	

GENERAL FURNACE REQUIREMENTS

Prior to this inspection, all required sequential inspections and correction notices must be completed. This is not an all-inclusive list and additional items may be required as determined during the inspection.

FURNACE REQUIREMENTS- CHECKLIST		
15.04.3.25.015 - CRC Section R303.10 added. Add the following new Section R303.10 to the California Residential Code: "R303.10 Each tenant or owner shall have access to their own mechanical heating equipment and water heater. A central Mechanical Room is permitted provided that each tenant or owner has access without being compelled to pass through another unit."		
Manufacture's installation and operating instructions on site for inspection. The appliance installer shall leave the manufacturer's installation and operating instructions attached to the appliance.		
Manufacture's installation and operating instructions: The appliance installer shall leave the manufacturer's installation and operating instructions attached to the appliance. CMC 303.1		
Required clearances from combustibles. Per AMI and CMC 904.2 CMC Table 904.2.2 CMC 905.1		
Condensate/sediment trap/drip leg: Where required by manufacture, drip leg shall be installed in such locations so that it will be readily accessible to permit cleaning or emptying and shall not be located where the condensate is likely to freeze. CMC 310.3 & 310.3.1 & 312.6 The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet or other device recognized as an effective sediment trap. CPC 1212.9 & 1212.10		
Combustion air to comply with CMC and manufacturer requirements regarding size, location, screening etc. Generally, two combustion air openings are required, one each in the upper and lower 12 inch of the furnace closet, sized at 1 square inch per 2000 BTU input rating of the furnace (horizontal comb air ducts) or 1 square inch per 4000 BTU (vertical comb air ducts). CMC 701.6.1 . Listed Direct vent appliances shall be installed per the appliance listing. CMC 907.1.2		
The reuse of existing venting systems may be allowed as long as the venting systems were originally code complying and remain safe to use. Transite (AC) vent material may not be relocated, altered or repaired to accommodate a furnace change-out.		
Gas shutoff valve: CMC 1312.6	a) Shall be in an accessible location and within 6' from the furnace. Connected to rigid piping upstream from the flexible connection in the same room as the furnace.	
Disconnect shall be adjacent to and within sight of furnace. CMC 301.4		
Dedicated circuit shall be provided for furnace CEC 422.12		
Access: Furnace shall be accessible for inspection, service, repair, & replacement without removing permanent construction. CMC 304		
Anchorage: Furnace shall be securely fastened in place to sustain vertical and horizontal loads. CMC 303.4		
Gas test required for new sections of gas pipe over 24" long or any new elbows or couplings. Test pressure 10 lbs per 15 min, using a rated 30lb max capacity gauge per CPC 1213.3		
Manufacture's installation and operating instructions: The appliance installer shall leave the manufacturer's installation and operating instructions attached to the appliance. CMC 303.1		

FURNACE IN BEDROOM OR CLOSET- CMC 904.1

☐	Closet shall be equipped with a listed, gasketed door assembly.
☐	Listed self closing device. (HOLD-OPEN FEATURE IS NOT ALLOWED)
☐	Door assembly shall be installed with a threshold and bottom door seal.
☐	Combustion air shall be only obtained from the outdoors.
☐	Closet shall be used for exclusive use of the furnace (NOT FOR STORAGE)

FURNACE IN ATTIC

☐	Attic access min. 22”x30”net clear opening. (Appliance must fit through opening).
☐	Electrical wiring shall be protected within 6’ of attic access scuttle opening.
☐	Passageway Min. 24” wide, unobstructed, solid flooring.
☐	Max. 20’ from access to appliance if passageway is less than 6’ high.
☐	Min. 30”x30” level working platform at front or service side of unit.
☐	Light and GFCI receptacle outlet required. Timer type light switch shall be located at attic entry and receptacle outlet within 25’ of furnace.
☐	Properly support and secure unit, support to be independent and not obstruct the service panel.

FURNACE UNDERFLOOR- CMC 904.3.1

☐	Crawl space access opening in foundation min. 18”x24”, or sized to provide removal of the largest piece of equipment to be removed from the opening.
☐	Suspend from floor a Min. 6” above ground OR support on slab a min. of 3” above grade.
☐	Excavations to provide clearances must be 6” below and 12” wider at sides and rear and 30” in front of the service side. If 12” is exceeded walls are lined with concrete or masonry 4” above ground level.
☐	Min. 12” side clearance and min. 18” clearance on control side of unit.
☐	Secure unit in place.
☐	Light and receptacle outlet required near appliance.

FURNACE IN GARAGE CMC 307.0

☐		Ignition min. 18” above floor.
☐		Protection from moving vehicles. (install bollard(s)
☐		Gas burning appliance venting shall comply with
☐		High efficiency gas appliance: Vent termination per manufacture instructions
☐		Condensate pumps used to elevate fluid until it is possible to drain by gravity. OAK
☐		Condensate pump interconnected with furnace relay to stop equipment function if pump becomes non-operational. OAK
☐		Condensate drain constructed of ¾” PVC sloped no less than 1/8” per foot and terminates in a drainage system as an indirect waste pipe and not over public right of way or:
	a)	to a landscaped area OAK
	b)	to 24”X24”X24” gravel pit OAK (SEE DET MECH01)

WALL FURNACES- CMC 907.1

☐	Top plates must be cut flush with the adjacent studs.
☐	Solid header plate must be attached to attach vent pipe
☐	The first plate line must be open with spacer straps only
☐	Subsequent plate lines must have firestop spacers installed.
☐	A sheet metal barrier must be installed against building paper or wood plaster lath.
☐	Vent termination must be 12’ min. above bottom of furnace.
☐	Vent must be protected in the attic by a metal sleeve (12” above ceiling and 2” below roof sheathing).
☐	Furnace shall not be closer than 6” to a room corner.
☐	Door swings must be 12” min. away from furnace.
☐	Projections above furnace shall be 18” min. away.
☐	Room must be at least 50 cu ft. in area per 1,000BTU

AIR CONDITIONERS

☐	Condensing unit must be on a pad at least 3 inches above grade.
☐	Line sets properly insulated, supported and fire wall penetrations adequately sealed.
☐	AC condensing units designed to be anchored in place by manufacturer shall be so anchored.
☐	Manufacturer required clearances shall be maintained.
☐	A/C compressor(s) Shall be indicated and located per approved site plan.
☐	Disconnect shall be readily accessible and not more than 6’-7” above grade. (do not install disconnect behind unit.) Identification of equipment: For more than one unit permanent identification on A/C unit disconnect.
☐	Secure A/C unit to platform.
☐	Verify that circuit breaker &/or fuse are sized per name plate.
☐	Verify that an accessible electrical receptacle is installed at the same level and within 25’ of the A/C unit. The outlet shall not be connected to the load side of the A/C disconnect.
☐	Refrigerant suction line with ¾” insulation, 1” if over 2” dia.
☐	Insulation protected from physical damage and UV resistant coating
☐	Manufacturer required clearances shall be maintained.
☐	Manufacturer’s installation instructions for the AC system shall be left on site for the inspector.

ENERGY EFFICIENCY

☐	2019 Energy Efficiency Standards setback thermostat installed CMC E 504.4.6.3.2 & ENG 105(h)4(I)
☐	2019 Energy Efficiency Standards Installation Certificate CF3R-MECH Forms Certificate of Verification complete

CONDENSATE DRAIN REQUIREMENTS

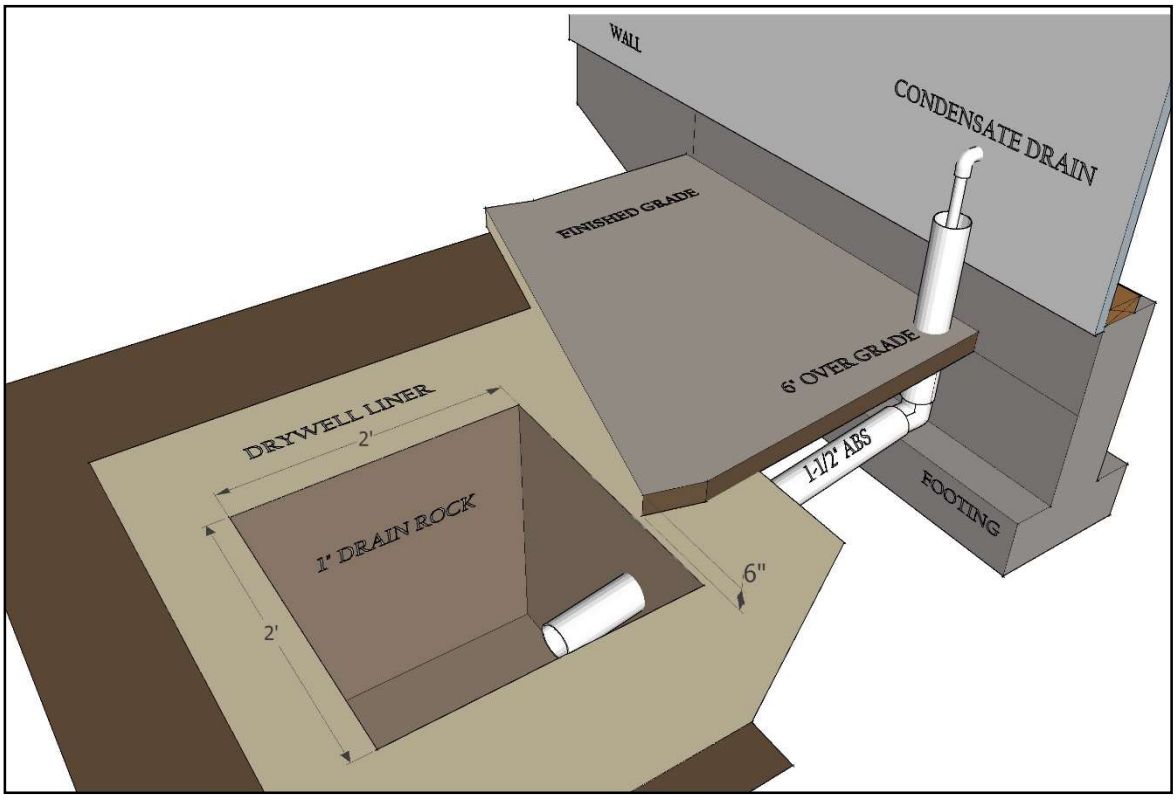
The proceeding information pertains to condensate discharge requirements for high efficiency furnaces and air-conditioning units in residential buildings.

Residential Condensate Disposal Requirements:

DRYWELL INSPECTION ITEMS

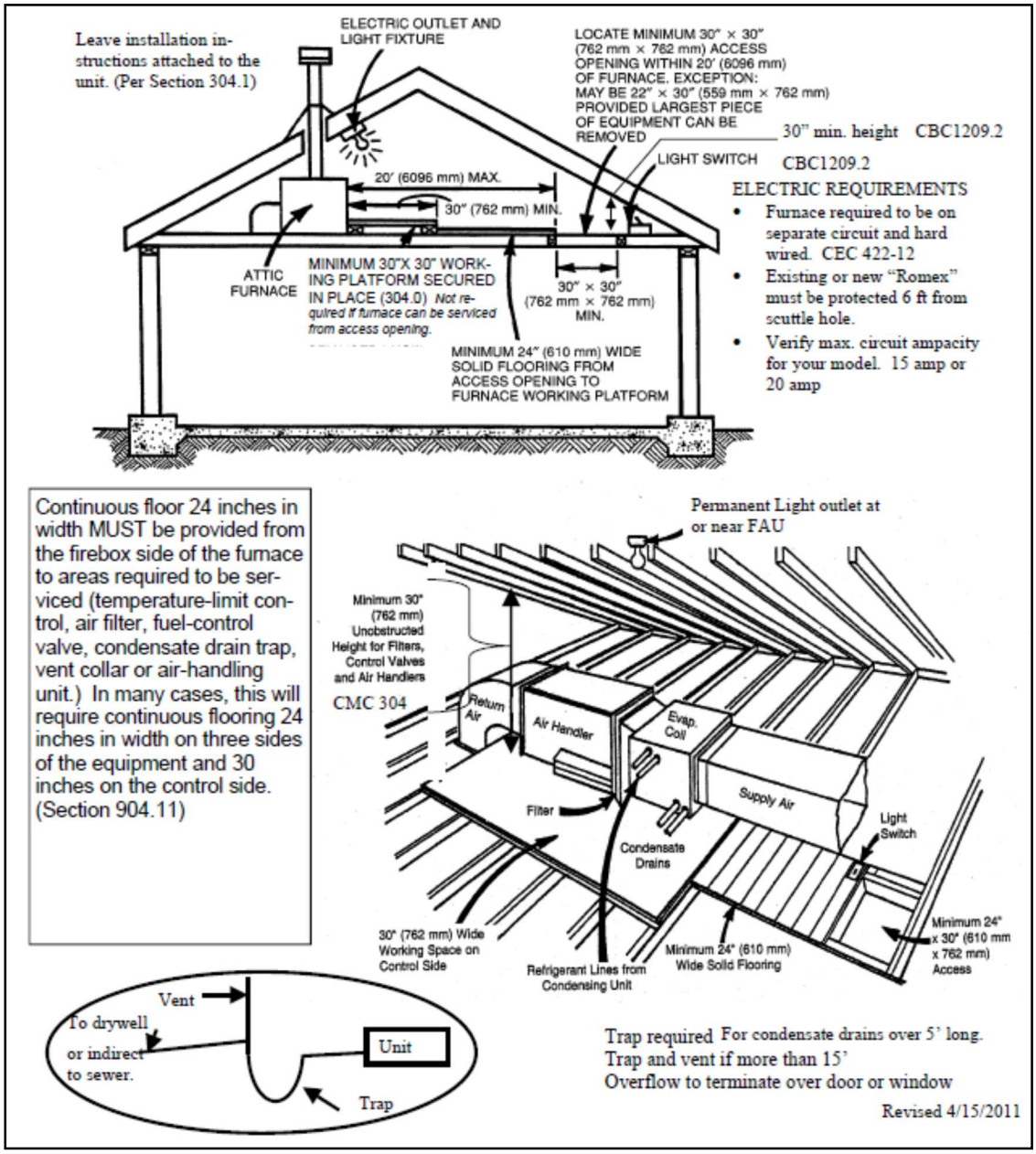
- ☐ Minimum 2'X2' square X 2' deep
- ☐ The nearest edge of the drywell shall be at least 3 feet from any structure or building foundation.
- ☐ The drywell shall be filled with min. 1" rock.
- ☐ The top of the drywell shall be covered with plastic sheeting with 6" of earth or concrete over.
- ☐ The condensate pipe from the cooling coil (minimum 3/4") shall indirectly connect to a minimum 1 1/2" drainpipe.

Note: The indirect connection shall be made by an air break at the edge of the foundation.



MECH001

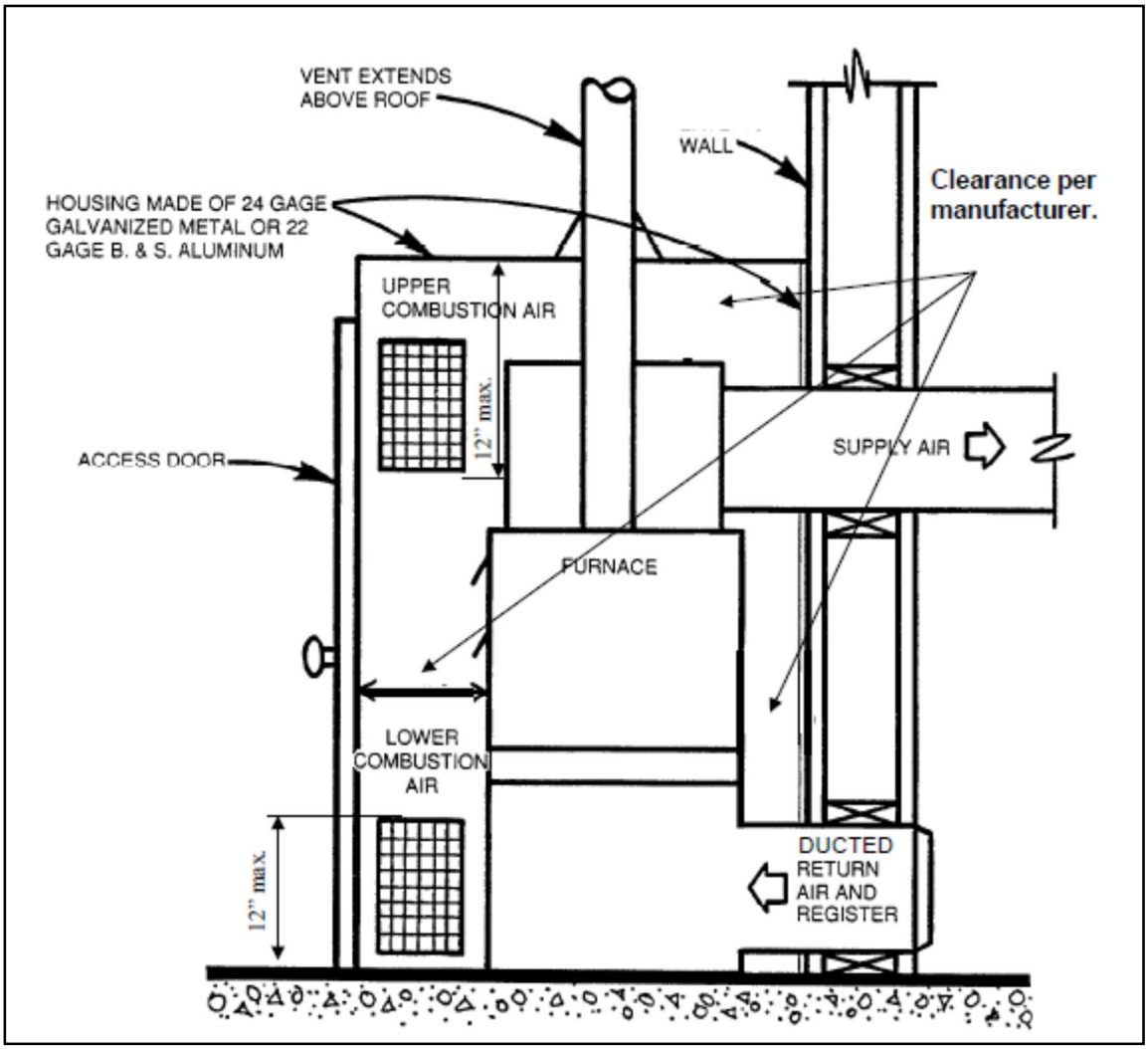
ATTIC FURNACE INSTALLATION



MECH002

CLOSET FURNACE CLEARANCES

NOTE: EQUIPMENT MUST BE LISTED FOR ALCOVE OR CLOSET INSTALLATION

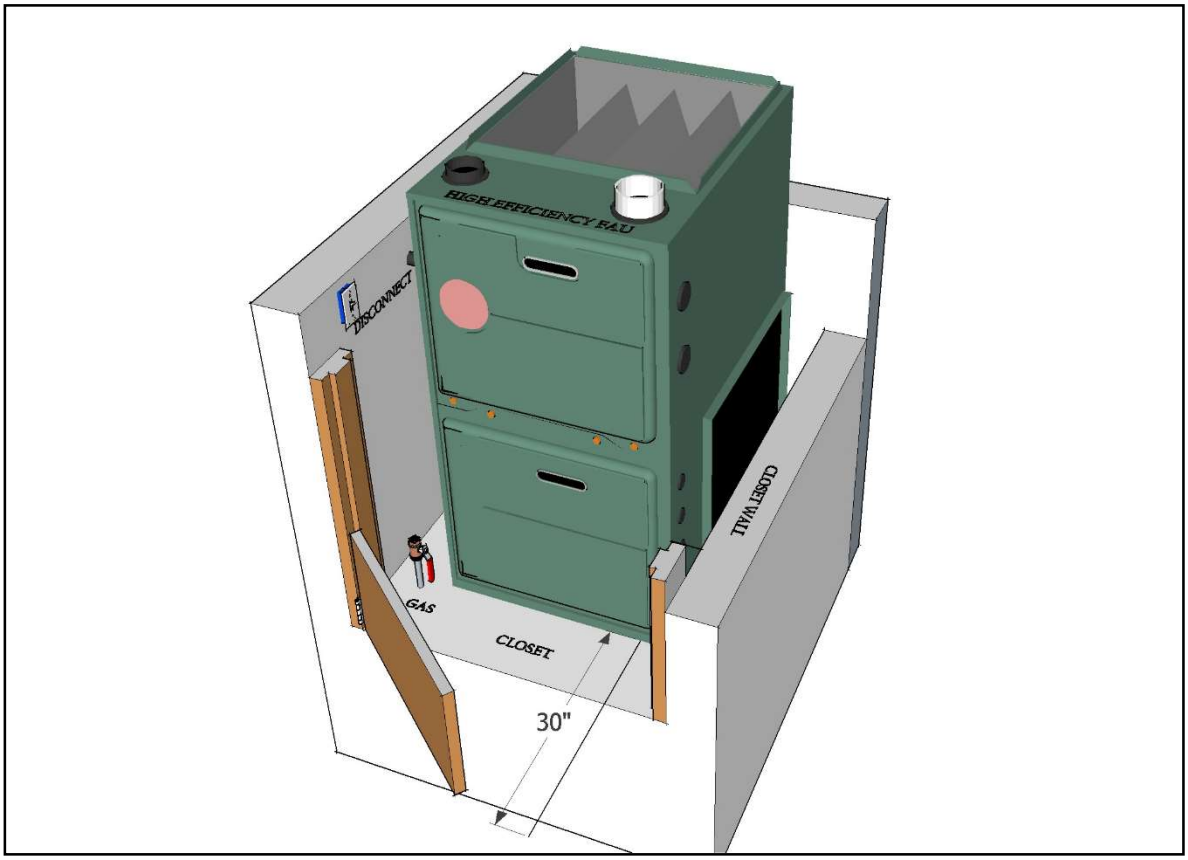


MECH003

CLOSET FURNACE CLEARANCES

NOTE: EQUIPMENT MUST BE LISTED FOR ALCOVE OR CLOSET INSTALLATION

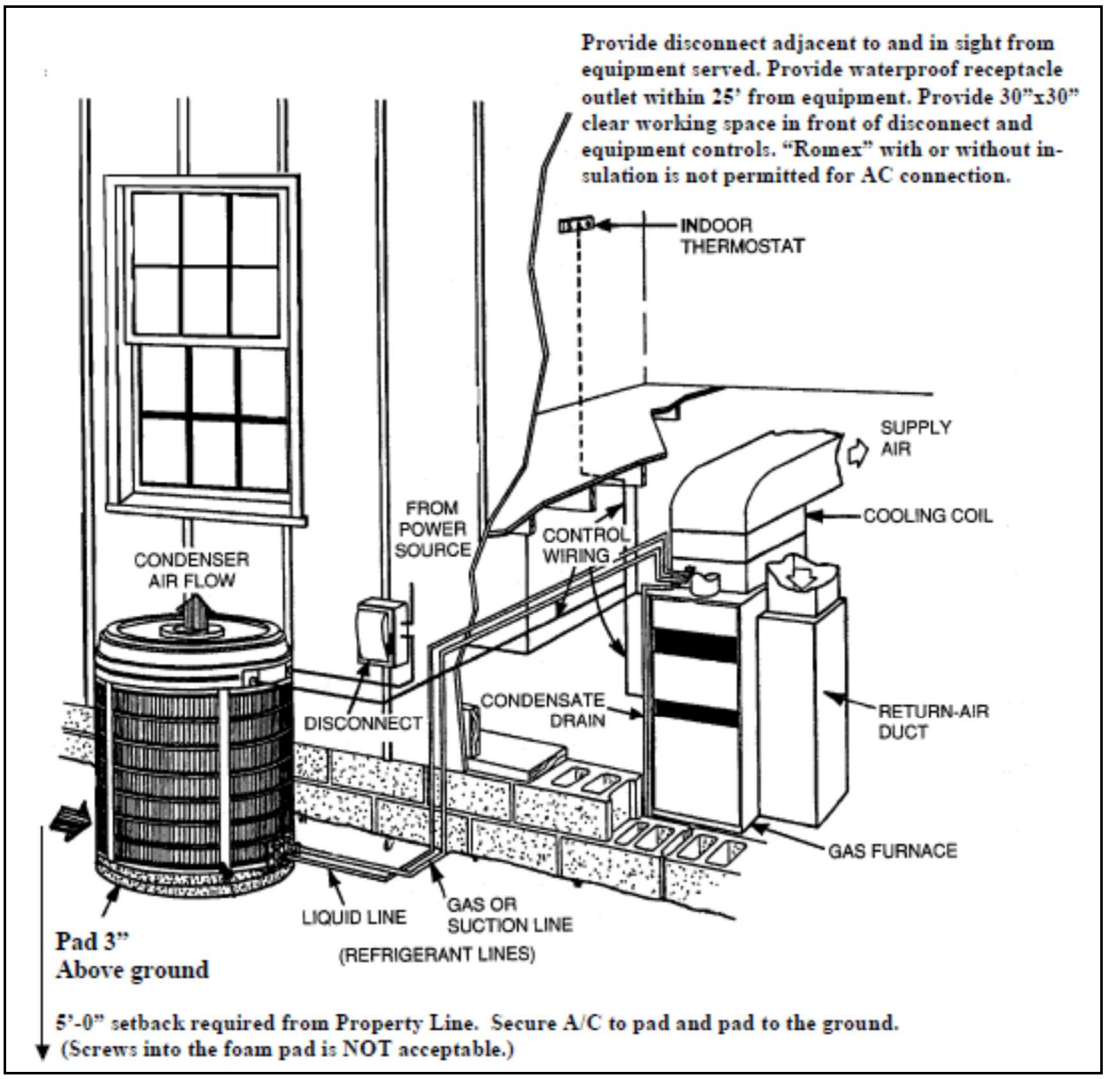
☐	Accessible secondary electrical disconnect rated for equipment load (no cords permitted)
☐	Accessible gas valve. Connector sized for equipment input rating
☐	Gasketed, self closing closet door must allow for removal of equipment
☐	Side clearance per manufacturer's specifications and sufficiently sized for inspection repairs of vent connectors, duct and plenum seals, electrical connections, gas valves, flex connectors and any parts of the equipment that may require access.
☐	30" minimum working space in front of equipment when door is open.



1MECH004

AIR CONDITIONING (A/C) SYSTEMS

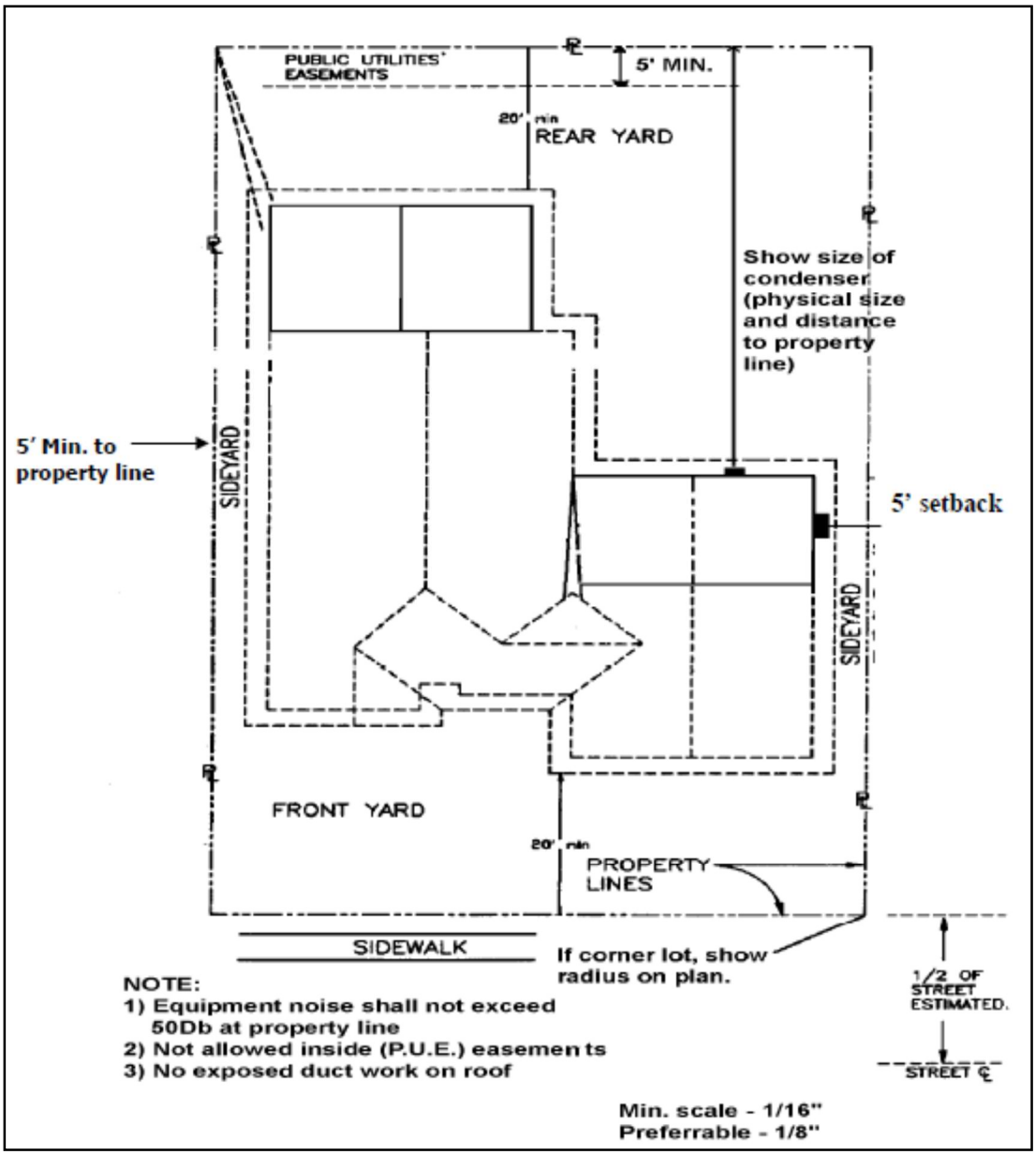
NOTE: A plot plan must be submitted showing the property lines and other buildings on the lot. Location of condensing unit, dimensions and distances from property lines.



MECH005

Typical "split system" air-conditioning system: upright gas furnace with integral cooling coil: condensing unit on the exterior of the building.

SAMPLE CONDENSER LOCATION PLOT PLAN



Chapter 6 Insulation

Inspection of insulation typically follows once the approval of ROUGH or FRAME is granted by the Building Inspector. The insulation shall be installed as per the Energy Calculations for the project or "Prescriptive Approach" as per California Energy Code. All penetrations through the building (crawlspace, top plates, attic, exterior) shall be filled accordingly. Any penetrations or walls that make up a Fire Rated separation shall be constructed as per code ie; penetrations filled with approved Fire rated materials, insulation to be Fire Rated, RC-Channel installed, Fire rated lighting fixtures, electrical boxes, or other building materials shall be verified as installed one more time.

INSULATION REQUIREMENTS

Prior to this inspection, all required sequential inspections and correction notices must be completed.
This is not an all-inclusive list and additional items may be required as determined during the inspection.

In order for batt and blown in insulation to work correctly the insulation must fill the wall cavity and touch the air barrier with no gaps or voids. Ceiling and raised floor batt and blown in insulation must not be compressed and have no gaps or voids.

INSULATION- CHECKLIST	
GENERAL	
☐	Permits and documents on site
☐	All previous inspections signed and approved
☐	Ladder provided and secured
FLOOR INSULATION	
☐	All floor joist cavity insulation installed to uniformly fit the cavity side-to-side and end-to-end.
☐	Insulation in full contact with the subfloor, *NO GAPS.*
☐	Insulation in contact with air barrier on all five sides. (ends, sides, back).
☐	Batts are cut to fit around wiring and plumbing.
☐	Batts have continuous support.
☐	Insulation R-value same or greater than listed on the CF-1R.
WALL INSULATION	
☐	Standard depth cavities insulation fills cavity and touches air barrier on all six sides.
☐	All double walls and bump-outs, the insulation fills the cavity or additional air barrier installed so that the insulation fills the cavity. Insulation touches all six sides.
☐	Behind tub/shower, walls under stairs, and fireplace, insulation touches air barrier on five sides. Cavity is required to be air tight.
☐	BATTS, not a single void/depression deeper than ¾" in ANY stud bay.
	NOTE: *Voids and depressions less than 3/4" allowed as long as the area is not greater than 10% of the surface area for each stud bay.*
☐	Foam insulate all penetrations at floor, floor to ceiling and ceiling to attic locations
☐	Any gaps between studs or insulation larger than 1/8" must be filled with insulation or foam.
☐	All Rim-joists to the outside insulated.
☐	Corner channels, wall intersections, and behind tub/shower enclosures insulated to proper R-Value.
☐	All skylight shafts and attic kneewalls insulated with minimum R-19. Insulation in full contact with drywall or wall finishes of skylight shafts and attic kneewalls.
☐	Wall insulation same or better than what is listed on the CF-1R
CEILING INSULATION	
☐	BATTS there must not be a single gap/void/depression deeper than ¾".
☐	Air space: Provide minimum 1" air space between insulation and roof sheathing
☐	BATTS voids/depressions less than 3/4" allowed as long as the area is not greater than 10% of the surface area for each stud bay.
☐	All ceiling insulation installed to uniformly fit the cavity side-to-side and end-to-end.
☐	Insulation in full contact with the ceiling, NO gaps.
☐	Insulation in contact with air barrier on all five sides.
☐	Batts cut to fit around wiring and plumbing, or split (delaminated).
☐	Batts taller than the trusses must expand so that they touch each other over the trusses. Insulation fully fills cavity below any plywood platform or cat-walk.
☐	Attic access gasketed.

☐	Attic access insulated with rigid foam or batt insulation using adhesive or mechanical fastener. R-value same as ceiling R-value listed on CF-1R
☐	Recessed light fixtures covered full depth with insulation. If SPF used then other forms of insulation used to cover or enclosed in a box fabricated from ½-inch plywood, 18 ga. sheet metal, 1/4-inch hard board or drywall
☐	Roof insulation same or better than what is listed on the CF-1R
☐	Insulation installed at joists against the air barrier in the garage to house transition.
☐	All wall insulation requirements above must be met. (NA if conditioned space over garage).
GARAGE ROOF/CEILING INSULATION FOR TWO STORIES (no conditioned space over garage)	
☐	If insulation is to be installed at subfloor then the insulation must also be installed at joists against the air barrier in the garage to house transition. All ceiling and wall insulation requirements above must be met. (NA if no conditioned space over garage).
GARAGE ROOF/CEILING INSULATION FOR TWO STORIES(conditioned space over garage)	
☐	If insulation is to be installed at ceiling of garage then the joists to the outside must be insulated and all the insulation requirements listed above must be met.
☐	If insulation is to be installed at ceiling of garage then the joists to the outside must be insulated and all the insulation requirements listed above must be met.
SLAB INSULATION	
☐	Verify slab-edge insulation R-Value.
☐	Verify below-grade wall insulation R-Value.
☐	Radiant heat slab, verify wall insulation and slab edge insulation, if required.
WINDOWS AND DOORS	
☐	All windows, skylights, and doors meet U-value per plans.
TUB TEST (fill tubs prior to inspection)	
☐	Tub test: Fill water above overflow.

CELULLOSE LOOSE-FILL INSULATION CHECKLIST

Prior to this inspection, all required sequential inspections and correction notices must be completed. This is not an all-inclusive list and additional items may be required as determined during the inspection.

☐	Permits and documents on site
☐	All previous inspections signed and approved – ROUGH APPROVED
☐	Ladder provided and secured
☐	NO gaps or voids allowed for loose fill
☐	Attic access is gasketed
☐	Insulation fully fills cavity below any plywood platform or cat-walk
☐	Attic access insulated with rigid foam or batt insulation using adhesive or mechanical fasteners.
☐	R-value same as ceiling R-value listed on CF-1R
☐	Recessed light fixtures covered full depth with insulation. (IC cans AT (air tight) and gasketed) If SPF used then other forms of insulation used to cover or enclosed in a box fabricated from ½-inch plywood, 18 ga. sheet metal, 1/4-inch hard board or drywall
☐	Roof insulation same or better than what is listed on the CF-1R
☐	Loose Fill Insulation at proper depth – insulation rulers visible and indicating proper depth and R-value for blown in insulation.
☐	Loose Fill Insulation uniformly covers the entire ceiling (or roof) area from outside of all exterior walls
☐	Loose-fill insulation meets or exceeds manufacturer's minimum weight and thickness requirements for the target R-value.
☐	Manufacturer's minimum required weight for the target R-value (pounds-per-square-foot). (HERS rater required for credit)
☐	Manufacturer's minimum required thickness at time of installation. (HERS rater required for credit)
☐	Manufacturer's minimum required settled thickness. (HERS rater required for credit)
INSTALLATION OVER KNOB AND TUBE WIRING CEC ARTICLE 394	
☐	*The wiring shall be surveyed by an electrical contractor licensed by the State of California. Certification shall be provided by the electrical contractor that the existing wiring is in good condition with no evidence of deterioration or improper over-current protection, and no improper connections or splices. Repairs, alterations, or extensions to the electrical system will require permits and inspections by the authority having jurisdiction for the enforcement of this code.*
☐	*The certification form shall be filed with the authority having jurisdiction for the enforcement of this code, and a copy furnished to the property owner.*
☐	*All accessible areas in the building where insulation has been installed around knob-and-tube wiring shall be posted by the insulation contractor with a notice, clearly visible, stating that caution is required when entering these areas. The notice shall be printed in both English and Spanish.*
☐	*The insulation shall be noncombustible as defined in Title 24,* A *Part* 2*, California Building Code.*
☐	*The insulation shall not have any electrical conductive material as part of or supporting the insulation material.*

Chapter 7 Drywall, Lath, Gast Test

Once approval of insulation has taken place. The inspector will grant the OK to COVER. At this time the Drywall can be installed as per plans. Note any Fire rated walls in the project and install drywall as per ASTME 1Hour rated assembly. Exterior lath, siding, or approved weather-resistant material can also be installed. Upon installation of drywall and exterior finish material a GAS TEST will be required to ensure that no nail, screw, staple, or other fastener has damaged the gas pipe.

DRYWALL INSPECTION

Prior to this inspection, all required sequential inspections and correction notices must be completed.
This is not an all-inclusive list and additional items may be required as determined during the inspection.

☐	Address to be posted, visible from road.
☐	Construction site is safe for inspection. Boards with nails and excessive debris removed. Ladders and scaffold properly secured.
☐	Best Management Practices (BMP) are in place for stormwater control.
☐	Approved plans and permit card are on the job-site.
☐	Building gas piping test is under pressure not less than 15 lbs pressure for 10 minutes lbs gauge min.
☐	Gypsum products are not allowed in steam showers
☐	Green board no longer allowed in shower and tub compartments.
☐	Electrical boxes maximum setback ¼" from drywall face and no side gaps more than 1/8" to electrical outlet.
☐	Install ceiling drywall over edge of wall panel per gypsum association

WET LOCATIONS

☐		Site built shower pans are filled to the top of dam for test.
☐		Shower compartment min. 1024 sq. in. encompassing a 30" circle
☐		The threshold/dam shall not be less than 2 inches and not more than 9 inches measured from the top of the drain.
☐		Base for tile in shower and tub compartments: Cement, fiber-cement or glass mat gypsum backers shall be used as a base for wall and ceiling panels in shower and bathtub compartments and shall be installed per manufacturer's recommendations.
☐		Water resistant gypsum board (green board) shall not be used in the following locations:
	a)	In shower or bathtub compartments. Where there will be direct exposure to water or in areas subject to continuous high humidity.
	b)	On ceilings where frame spacing exceeds 12" on center for ½" wall board and more than 16" on center for 5/8" water-resistant drywall.

ATTACHED GARAGE R3-U PER OMC 15.04.602

☐		A group U private garage shall be separated from a dwelling unit and its attic area by not less than 5/8 type X gypsum wallboard or equivalent on the garage applied on the garage side. OMC 15.04.602.
	a)	Fasteners shall not be spaced less than 3/8" from edges and ends of wall board. Ducts penetrating occupancy separation rated wall to be 26 gage sheet metal

FASTENING TABLES CRC 702.3

Screw type and application table:

Type Screws	Application
Type G screws	For attaching gypsum to gypsum.
Type S screws	*For attaching gypsum to light gage steel framing. (Non-Load Bearing)
Type S-12 screws	For attaching gypsum to heavy gage steel framing. (Structural)
Type W screws	For attaching gypsum to wood framing.

* shall not be less than 25 gage steel

Fastener penetration: (wood)
Penetration shall be long enough to penetrate into wood framing members not less than:
Screws: 5/8" Nails: ¾"
Fastener penetration: (steel)
Screws into metal members not less than 3/8"
Fastener spacing table for single-layer gypsum wallboard:

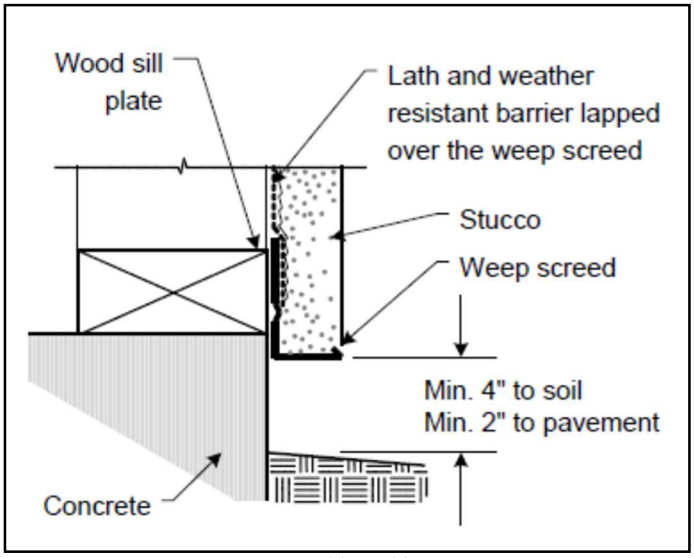
GYPSUM WALLBOARD THICKNESS	DIRECTION OF FRAMING	MAXIMUM FRAMING MEMBER SPACING	MAXIMUM NAIL SPACING	MAXIMUM SCREW SPACING
½"	vertical	16	8	16
½"	horizontal	16	7	12
½"	vertical	24	7	12
½"	horizontal	24	8	12
5/8"	vertical	16	8	16
5/8"	horizontal	16	7	12
5/8"	vertical	24	8	12
5/8"	horizontal	24	8	12

STUCCO LATH AND STUCCO REPAIR CHECKLIST

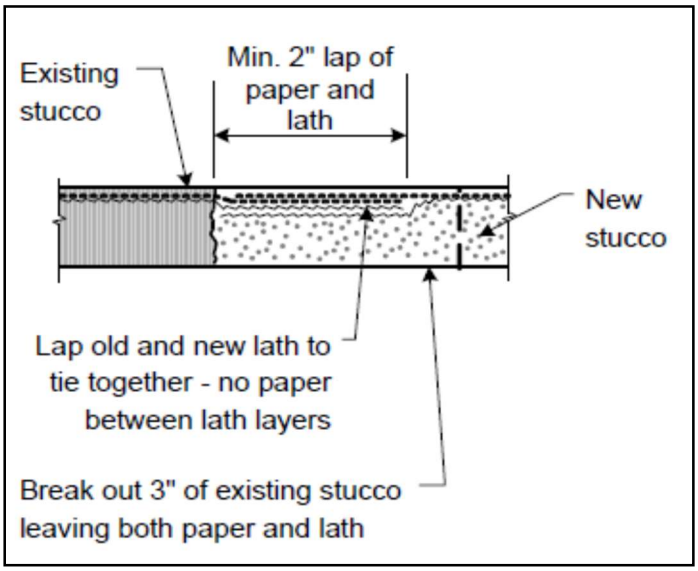
Prior to this inspection, all required sequential inspections and correction notices must be completed.
This is not an all-inclusive list and additional items may be required as determined during the inspection.

☐	1	Address to be posted, visible from road.
☐	2	Toilet facilities are on-site. OMC 15.04.070
☐	3	Construction site is safe for inspection. Ladders and scaffold properly secured.
☐	4	Best Management Practices (BMP) are in place for storm-water control.
☐	5	Approved plans and permit card are on the job-site.
☐	6	All penetrations must be caulked/ waterproofed.
☐	7	Weep screed placed a minimum of 4" above the earth or 2" above paved areas or similar surfaces.
☐	8	Weather resistive barrier includes two layers of grade "D" paper and is applied horizontally with the upper layer lapped over the lower layer no less than 2". Where vertical joints occur, paper is lapped not less than 6".
☐	9	Lath attachments and fasteners shall be corrosion resistant materials.
☐	10	Attachments shall be made at framing members. ASTM C926, C1063
☐	11	Metal or wire lath shall be applied with the long dimension of the sheets perpendicular to supports. ASTM C926, C1063
☐	12	Metal lath shall be lapped not less than 1/2" at sides and 1" at the ends. Wire lath shall be lapped not less than one mesh at sides and ends, but not less than 1". Overlap round corners 12".
☐	13	Fasteners to wood shall be spaced no less than 6" vertically and 16" horizontally. Staples 8" O.C. when used with self-furring lath only.
☐	14	Metal and wire lath shall be furred out away form vertical supports at least 1/4". Self-furring lath shall meet furring requirements. ASTM C926, C1063
☐	15	External corner reinforcement required. ASTM C926, C1063
☐	16	All flashings including foundation vents at building perimeter must be in place, having exterior lath over vent flange resulting in weather tight construction.
☐	17	All lath paper damaged or torn shall be replaced with new or sealed as required including being free from holes and breaks other than those created by fasteners.
☐	18	Control joints separate areas greater than 144sqft (100sqft horizontal surfaces) ASTM C926, C1063
		STUCCO REPAIRS AND PATCHING
☐	R1	The new lath and backing paper overlap the existing lath and backing paper two inches. SEE FIGURE B
☐	R2	Approximately three inches of existing plaster at the new joint be broken out leaving the lath and backing paper intact and exposed. SEE FIGURE B
☐	R3	Old concrete joint line is jagged (no straight saw cuts)
☐	R4	The new and existing backing papers are lapped and the new and existing lath is lapped (see Figure "B" for splicing detail).
☐	R5	Wire lath shall be installed over at least one layer of a weather resistant barrier
☐	R6	When stucco is installed on solid plywood sheathing, two layers of weather resistant barrier material are installed.

STUCCO DETAILS (TYPICAL)



WEEP SCREED INSTALLATION FIGURE A



NEW TO OLD STUCCO JOINT FIGURE B

RESIDENTIAL GAS DELIVERY SYSTEM INSTALLATION & SIZING

The information provided in this brochure answers a number of commonly asked questions. For additional information please refer to the California Plumbing Code or speak with one of the City's Building Inspectors.

☐	Plumbing permit must be obtained prior to the installation, alteration or repair of a gas piping system.
☐	All pipe used for the installation, extension, alteration, or repair of any gas piping shall be standard weight Schedule 40 wrought iron or steel (galvanized or black)
☐	Corrugated stainless steel tubing. Approved PE pipe may be used in exterior buried piping systems when installed by certified technicians.
☐	An exterior shutoff valve shall be installed before the line enters the building
☐	Sediment traps must be installed on furnaces, wall heaters, boilers and water heaters downstream of shutoff valves.
☐	Corrugated stainless steel systems should be bonded to the electrical service grounding electrode system where it enters the building
☐	Gas piping shall not be used as a grounding conductor or electrode but it may be bonded.
☐	Steel pipe installed outside and underground shall have no less than 12 inches of cover (where no damage is likely). And no less than 18 inches of cover in other areas.
☐	Where unions are necessary, right and left nipples and couplings shall be used. Ground joint unions may only be used at exposed fixtures, appliance, or equipment connections and in exposed exterior locations immediately on the discharge side of a building shutoff valve. OMC15.04.940
☐	An accessible shutoff valve shall be installed in the fuel supply piping outside of each appliance and ahead of the union connection thereto, in addition to any valve on the appliance. Shutoff valves shall be in the same room as the appliance and no further than 6 feet from the appliance.
☐	INSPECTION 1: Underground exterior gas piping requires one inspection which will occur after the pipe has been installed in a trench and pressurized but before it is covered.
☐	INSPECTION 2: After the piping system has been installed but prior to it being covered or concealed, or any fixture or appliance has been attached thereto. This inspection will check for proper pipe size, material, and installation. Although not required, it is recommended that the piping system be pressurized.
☐	INSPECTION 3: consists of a pressure test and occurs after the building is completely enclosed but prior to connecting any equipment or appliances. *For projects in which the gas piping will remain exposed, both inspections would be combined into a single inspection.*
☐	Gas piping systems will be pressure tested at least once during the inspection process. The permit holder shall provide and install a temporary pressure gauge and to pressurize the piping system. All gas piping systems shall be pressurized using air, CO2, or nitrogen. For residential installations the gas piping system shall be pressurized to no less than ten (10) psi. and shall hold that pressure for no less than 15 minutes. The gauge used for the pressure test shall have a pressure range not greater than twice the test pressure applied and shall have 1/10 psi increments. OMC 15.04.950 , OMC15.04.955
☐	Gas pipe needs to be sized correctly. You can size the gas pipe by following the example in this handout or you may request assistance from a Building Inspector. For the Building Inspector to help, you must provide a piping layout (similar to Figure “C”) with the lengths of all piping and the input demand load of all appliances shown on the drawing. Sizing the pipe will depend on the type of pipe being used.

Gas Pipe Sizing

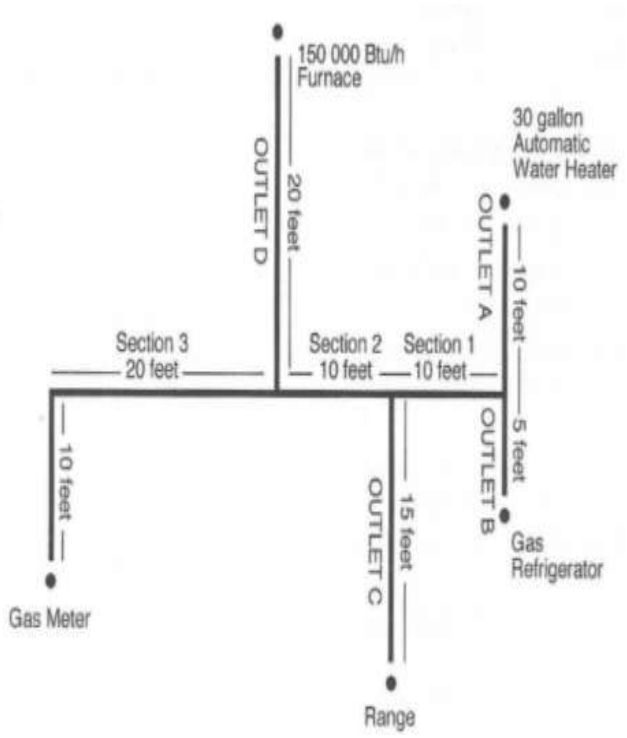


Figure 12-2

TABLE 12-1		
APPLIANCE		INPUT Bth/h
Furnace		100,000
Hydronic boiler		100,000
Water heater, storage 30-40gl		35,000
Water heater, storage 50gl		50,000
Tankless	2 gl/min	142,800
	4 gl/min	285,000
	6 gl/min	428,400
Free standing range		65,000
Built-in cooktop		40,000
Built-in oven or broiler		25,000
Clothes dryer domestic		35,000
Gas fireplace direct vent		40,000
Gas log lighter		80,000
Barbecue		40,000
Refrigerator		3,000
Note: The demand ratings of the appliances listed in this table are minimums. Demand ratings of the actual installed appliances may be higher. Refer to name plate rating on appliance - use the input Btu/Hr number. The tables used to size gas piping are based on Cubic Feet per Hour (CF/H). To convert Btu/Hr to CF/H divide the Btu/Hr by 1,000 (per PG&E delivery capacity), which is the number of Btu/Hr in a single cubic foot of natural gas		

Solution:

(1) -Maximum gas demand of **outlet A**- 35 cubic feet per hour (actual input/1000) (from Table 12-1)
-Maximum gas demand of **outlet B**- 80 cubic feet per hour (actual input/1000) (from Table 12-1)
-Maximum gas demand of **outlet C**- 65 cubic feet per hour (actual input/1000) (from Table 12-1)
-Maximum gas demand of **outlet D**- 100 cubic feet per hour (actual input/1000) (from Table 12-1)

(2) The length of pipe from the gas meter to the **most remote outlet** (**outlet A**) is 60 feet.

(3) **Using the length in feet column row marked 60 feet in Table 12-8**:
Outlet A, supplying 35 cubic feet per hour, requires one-half (1/2) inch pipe.
Section 1, supplying **outlets A and B**, or 115 cubic feet per hour requires three-quarter (3/4) inch pipe.
Section 2, supplying **outlets A, B, and C**, or 180 cubic feet per hour requires one (1) inch pipe.
Section 3, supplying **outlets A, B, C, and D**, or 280 cubic feet per hour, requires one & one-quarter (1-1/4) inch pipe.

(4) Using the column marked 60 feet in Table 12-8 (no column for actual length of 55 feet).
Outlet B, supplying 80 cubic feet per hour, requires three-quarter (3/4) inch pipe.
Outlet C, supplying 65 cubic feet per hour, requires three-quarter (3/4) inch pipe.

(5) Using the column marked 60 feet in Table 12-8:
Outlet D, supplying 100 cubic feet per hour, requires three quarter (3/4) inch pipe.

LONGEST LENGTH METHOD					
				Demand CF/Hr	
Outlet	Appliance	Length ft	Demand BTU table 12-1	/1000 BTU/CUFT	Pipe Size table 12-8
A	30gl water heater	**60** (use on 12-8)	35000	35	1/2
B	Gas log lighter	55	80000	80	3/4
C	Range	55	65000	65	1/2
D	Furnace	50	100000	100	3/4

Section					
1	A+B			115	3/4
2	A+B+C			180	1
3	A+B+C+D			280	1-1/4

STEEL PIPE

CORRUGATED STAINLESS STEEL

TABLE 1215.2(14)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54: TABLE 6.2(o)][1,2]

GAS:	NATURAL
INLET PRESSURE:	LESS THAN 2 psi
PRESSURE DROP:	0.5 in. w.c.
SPECIFIC GRAVITY:	0.60

	TUBE SIZE (EHD)[3]													
FLOW DESIGNATION :	13	15	18	19	23	25	30	31	37	39	46	48	60	62
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR													
5	46	63	115	134	225	270	471	546	895	1037	1790	2070	3660	4140
10	32	44	82	95	161	192	330	383	639	746	1260	1470	2600	2930
15	25	35	66	77	132	157	267	310	524	615	1030	1200	2140	2400
20	22	31	58	67	116	137	231	269	456	536	888	1050	1850	2080
25	19	27	52	60	104	122	206	240	409	482	793	936	1660	1860
30	18	25	47	55	96	112	188	218	374	442	723	856	1520	1700
40	15	21	41	47	83	97	162	188	325	386	625	742	1320	1470
50	13	19	37	42	75	87	144	168	292	347	559	665	1180	1320
60	12	17	34	38	68	80	131	153	267	318	509	608	1080	1200
70	11	16	31	36	63	74	121	141	248	295	471	563	1000	1110
80	10	15	29	33	60	69	113	132	232	277	440	527	940	1040
90	10	14	28	32	57	65	107	125	219	262	415	498	887	983
100	9	13	26	30	54	62	101	118	208	249	393	472	843	933
150	7	10	20	23	42	48	78	91	171	205	320	387	691	762
200	6	9	18	21	38	44	71	82	148	179	277	336	600	661
250	5	8	16	19	34	39	63	74	133	161	247	301	538	591
300	5	7	15	17	32	36	57	67	95	148	226	275	492	540

For SI units: 1 inch= 25 mm, 1 foot= 304.8 mm, 1 cubic foot per hour= 0.0283, m^3 /h, 1 pound-force per square inch= 6.8947 kPa, 1 inch water column = 0.249 kPa

Notes:

[1] Table entries are rounded to 3 significant digits.

[2] Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: L = 1.3 n, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.

[3] EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

GAS DELIVERY SYSTEM SIZING WORKSHEET

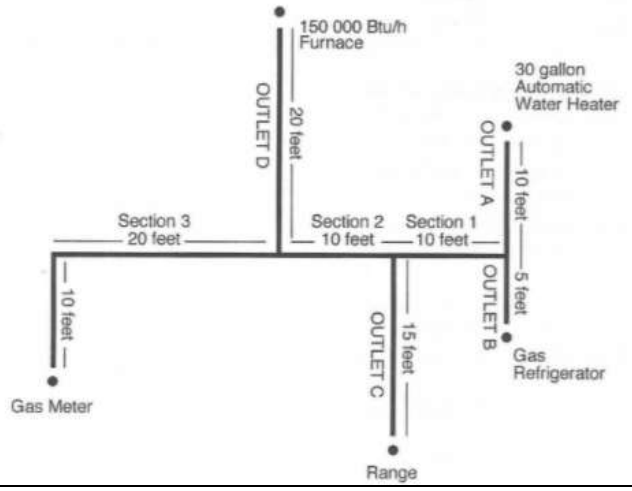


Figure 1-Gas Supply Layout

TABLE 12-1		
APPLIANCE		INPUT Bth/h
Furnace		100,000
Hydronic boiler		100,000
Water heater, storage 30-40gl		35,000
Water heater, storage 50gl		50,000
Tankless	2 gl/min	142,800
	4 gl/min	285,000
	6 gl/min	428,400
Free standing range		65,000
Built-in cooktop		40,000
Built-in oven or broiler		25,000
Clothes dryer domestic		35,000
Gas fireplace direct vent		40,000
Gas log lighter		80,000
Barbecue		40,000
Refrigerator		3,000

Note: The demand ratings of the appliances listed in this table are minimums. Demand ratings of the actual installed appliances may be higher. Refer to name plate rating on appliance - use the input Btu/Hr number. The tables used to size gas piping are based on Cubic Feet per Hour (CF/H). To convert Btu/Hr to CF/H divide the Btu/Hr by 1,000 (per PG&E delivery capacity), which is the number of Btu/Hr in a single cubic foot of natural gas

TABLE 12-8
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.2(b)]

GAS:	NATURAL
INLET PRESSURE:	LESS THAN 2 psi
PRESSURE DROP:	0.5 in w.c.
SPECIFIC GRAVITY:	0.60

	PIPE SIZE (inch)													
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4	5	6	8	10	12
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026	5.047	6.065	7.981	10.020	11.938
LENGTH (ft)	CAPACITY IN CUBIC FEET OF GAS PER HOUR													
10	172	360	678	1,390	2,090	4,020	6,400	11,300	23,100	41,800	67,600	139,000	252,000	399,000
20	118	247	466	957	1,430	2,760	4,400	7,780	15,900	28,700	46,500	95,500	173,000	275,000
30	95	199	374	768	1,150	2,220	3,530	6,250	12,700	23,000	37,300	76,700	139,000	220,000
40	81	170	320	657	985	1,900	3,020	5,350	10,900	19,700	31,900	65,600	119,000	189,000
50	72	151	284	583	873	1,680	2,680	4,740	9,660	17,500	28,300	58,200	106,000	167,000
60	65	137	257	528	791	1,520	2,430	4,290	8,760	15,800	25,600	52,700	95,700	152,000
70	60	126	237	486	728	1,400	2,230	3,950	8,050	14,600	23,600	48,500	88,100	139,000
80	56	117	220	452	677	1,300	2,080	3,670	7,490	13,600	22,000	45,100	81,900	130,000
90	52	110	207	424	635	1,220	1,950	3,450	7,030	12,700	20,600	42,300	76,900	122,000
100	50	104	195	400	600	1,160	1,840	3,260	6,640	12,000	19,500	40,000	72,600	115,000

OUTLET	LENGTH (from meter)	INPUT (12-1/1000)	PIPE SIZE (from 12-8)	LONGEST (use next higher in 12-8)

SECTION	INPUT (i.e. a+b)	INPUT (total)	PIPE SIZE (from 12-8)	

Chapter 8 Electrical Panel Release

Upon approval of Drywall and Exterior finish material installation, the Electrical Service can be released. An Electrical Meter Release inspection will take place to ensure that the electrical system is installed correctly, and that there are no short-circuits due to a fastener damaging any of the wiring during the installation of drywall and exterior finish materials. The Electrical Meter Release can only be issued once all walls have been covered and are protected.

Electric and Gas Utility Releases in the City of Oakland

1- **Apply** for and obtain City of Oakland permit for your Electrical or Gas Service.

2- Contact PGE to obtain **Confirmation of Discussion (COD)**. Permit Inspections cannot inspect Electrical Meters, if PGE COD is not on-site. **PGE COD is not required for Gas Utility Release.**

3- **Schedule your Inspections**

4- If your inspection passes the City of Oakland will place a Green Tag on the Electrical Panel (no tag needed for Gas Service) and will release the meter to PGE by next day at Noon.

5- **Call PGE** to have your utility connected by them.

If installing, modifying, or removing an Electrical or Gas Service you must contact PG&E and follow their requirements to obtain service. Please note that you must contact PG&E to obtain a Confirmation of Discussion (COD) for electrical meter inspection in the City of Oakland.

PGE CONFIRMATION OF DISCUSSION

If installing, modifying, or removing an Electrical or Gas Service you must contact PG&E and follow their requirements to obtain service. Please note that you must contact PG&E to obtain a Confirmation of Discussion (COD) for electrical meter inspection in the City of Oakland.

PG&E CONFIRMATION OF DISCUSSION

What is a Confirmation of Discussion (COD)?

A COD is a document required by PG&E for electrical service work. City Inspectors are required to review this document on site before performing an inspection for any electrical service and affixing a green sticker to the equipment which allows for a final connection.

Before calling the City for an electrical service release inspection, please be sure that a field representative from PG&E has performed the site verification and provided a COD.

A COD is required for the following:

- New electrical services
- Electrical service upgrades
- Meter resets
- Repair of tree damaged risers

What information in contained in a COD? See the sample.

Pacific Gas and Electric Company
East Bay – Oakland Service Planning

Notification/Application #: 123 456789
This document is required prior to City inspection

Confirmation of Discussion & Site Visit Verification

Applicant: Phone:
Project Location:
Party to Discussion: Name: Title: PH#: Email:

Notes: *All work must comply with PG&E's current Electric and Gas Service Requirements manual (Greenbook) – available online at www.pge.com/greenbook/
*Applicant is responsible for contacting the City with jurisdiction for any applicable permits before starting construction.
*City approval may be denied until all infractions indicated below are corrected.

Electric:
☑ New OH or UG Service (circle to indicate)
☐ Re-arrange OH or UG Service (circle to indicate)
☐ Split Electric Load/Additional Meter(s)– Subject to PG&E & City approval
☐ Simple swing OH Service to New Weatherhead
Electric Info: 1 meter(s); 120/240volt; 1 phase; 3 wire service.

Gas:
☐ New Gas Meter Installation Only
☐ Split Gas Loads (Manifold & Meter Installation Only)
☐ New Gas Service/Meter
☐ Re-arrange/Move Gas Service/Meter
Gas Load: _____mbtu @ ____PSI; ____meter(s)

Project Information:
☐ Right of Way/Easement required?
☐ Trenching Agent (if required) _____PG&E or _____Applicant
☐ Split Trench Franchise _____P.P.
☐ Joint Trench with ____Electric, ____Gas, ____Telephone, ____Cable TV (check all applicable)

Confirmation of Meter Location Sketch:

General requirements before permanent electrical service connection and/or gas meter installation:
☐ Address is permanently marked on the panel (for electric) and/or on the houseline (for gas)
☑ Receive "meter release"/inspection from applicable city/county
☑ Maintain at least 3 feet separation between gas riser & the edge of electric panel (& any electrical/solar equipment, etc.)
☑ Meter location is accessible with proper working space – 3 feet minimum in front of meter
☑ Electric meter panel installed at correct height, 48" minimum and 75" maximum (centerline @ 66" is preferred)
☐ Electric meter panel maintains at least 10 inches from the nearest inside corner or other obstruction
☑ Periscope has proper clearances: 18" maximum back from front wall/overhang, radial clearance from communication line, 3 feet minimum from any operable window(s), 12 feet minimum above standing surface, etc.
☑ Periscope needs bracing with an a-frame support: Minimum two galvanized steel members at a 90-degree spread
☐ Need additional straps on periscope conduit: Every 36" with 2-hole straps and 3/8" x 3" lag bolt (min.)
☐ Need to install point of attachment for OH service to house or on periscope
☐ Tree trimming to provide clear path for OH electric service
☐ Bollards required to protect metering facilities from vehicular traffic

Other: 150A to 200A upgrade. New panel will be relocated to the right of the gas riser to get propert clearance, and downspout will be relocated.

PG&E Representative Name: Carl Mune Phone: 209-272-8680
Email Address: CHM3@pge.com Date: 11/19/18

Version 5/9/2017

RESIDENTIAL OVERHEAD ELECTRICAL SERVICE UPGRADE

BASED ON THE 2010 CALIFORNIA ELECTRICAL CODE AND PG&E GREEN BOOK
Prior to this inspection, all required sequential inspections and correction notices must be completed.
This is not an all-inclusive list and additional items may be required as determined during the inspection.

☐	Permit documents on site
☐	PG&E application (COD) Confirmation of Discussion number on site
☐	Verify correct permit description for service amperage.
	PANEL LOCATION
☐	30" wide x 36" deep level and unobstructed working space in front of panel (not in a "dog house". CEC 110.26(A)(1)&(2)
☐	Meter socket located between 48"min and 75" max from grade. PG&E
☐	Panel located in front of building requires Zoning approval. OAK
☐	May not encroach on a 9' wide or less driveway. OAK
☐	Where subject to vehicle damage: 2 -3" diameter concrete filled bollards are installed (min 9' wide driveway is maintained. PG&E (Exempted in recessed panel applications)
☐	Panel is located at least 3' form any property line when located on side of building. CEC 110.26(A)(1)
☐	Provides 36" min distance from gas service Tee. PG&E
☐	Maintains 36" min distance form gas riser. PG&E
☐	Located 8" min from building edge. PG&E
	SERVICE ENTRANCE
☐	Riser min. 1-1/4" diameter rigid steel or 2" rigid aluminum. PG&E
☐	Heavy duty Riser straps within 36" of service enclosure and every 36" after, using 3/8" x 3" min. lag screws directly attached to building framing. PG&E
	WEATHERHEAD
☐	Maximum 18" beyond eave strap (no couplings)
☐	Periscope 18" behind building wall facing the service line.
☐	Located a max 48" beyond any roof line (service drop conductors travel over roof limited to 48")
☐	Riser braced if over 30" from roof line OAK
	METER MAIN AND SUB-PANELS
☐	Suitable for use as service equipment CEC 230.66
☐	Main Service Disconnecting means rated not less than 100 amps, 3 wire. CEC 230.79(C)
☐	Main Service disconnects breaker max 6'-7" from level grade. CEC 240.24(A)
☐	All breakers permanently labeled.
☐	Knob and Tube wiring limited 15 amps, Extensions of existing installations CEC394.10
☐	Arc Fault breakers required for all 15&20 amp branch circuits serving outlets or devices in kitchens, family room, dining room and living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas. CEC 210.12(A) OMC15.04.3.3005
☐	Feeders to existing sub-panels rated for required load
☐	Edison-Base fused sub-panels with new feeders are limited to 125 volts 30A or less modified to comply with CEC 240.52 Retrofitted to accept S type fuses permanently.
☐	Working space area and headroom for new sub-panels min 6'6" per CEC 110.26(A)(1)&(2)
	GROUNDING
☐	1/2" grounding rod (under 200 amps) or 5/8" (for 200amps) installed near service equipment and driven a minimum of 8' into the ground.
☐	Single piece #6 (under 200 amps) or (#4 for 200 amps) copper conductor connecting Neutral Bus, Grounding rod and Metallic main water service within the first 5' after entering the building.

	"Acorn" clamp used for grounding electrode conductor to grounding Rod electrode or UFER bar.	
	"Weaver" clamp used for connection to water main.	
☐	For grounding of non-metallic water services use secondary electrode XXX	
☐	Bonding Jumper at water heater location, between hot and cold water and gas piping #6 AWG Cu. for 100 amp service. #4 AWG Cu 200 amp service CEC table 250.122 .	
	SERVICE ENTRANCE CONDUCTORS	
☐	Conductors identified at both ends.	

Conductors sized for load and entrance riser for capacity.

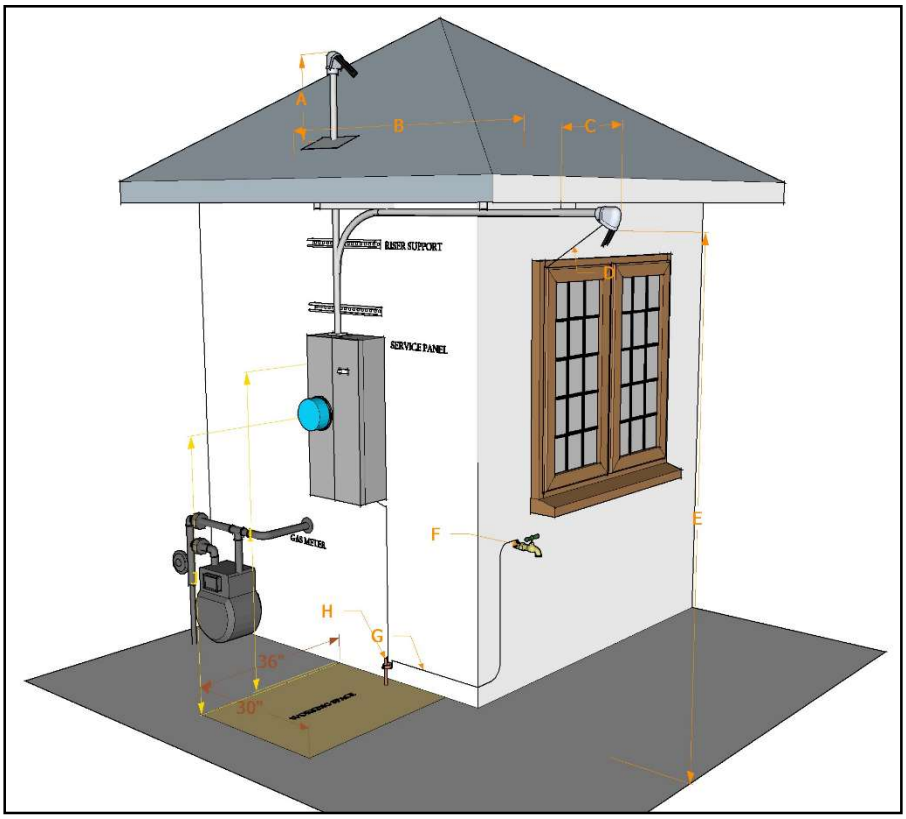
	CU	Rigid	AL	Rigid
100A	4	1-1/4"	2	1-1/4"
125A	2	1-1/4"	1/0	1-1/4"
150A	1	1-1/4"	2/0	1-1/2"
175A	1/0	1-1/4"	3/0	1-1/2"
200A	2/0	1-1/2"	4/0	2"

☐	Minimum 18" long conductor length beyond the weather head. PG&E
☐	Minimum 12" separation from communication lines. PG&E
☐	Minimum 36" distance from operable portions of windows, balconies and decks. PG&E
☐	Minimum 12" on top of operable windows. PG&E

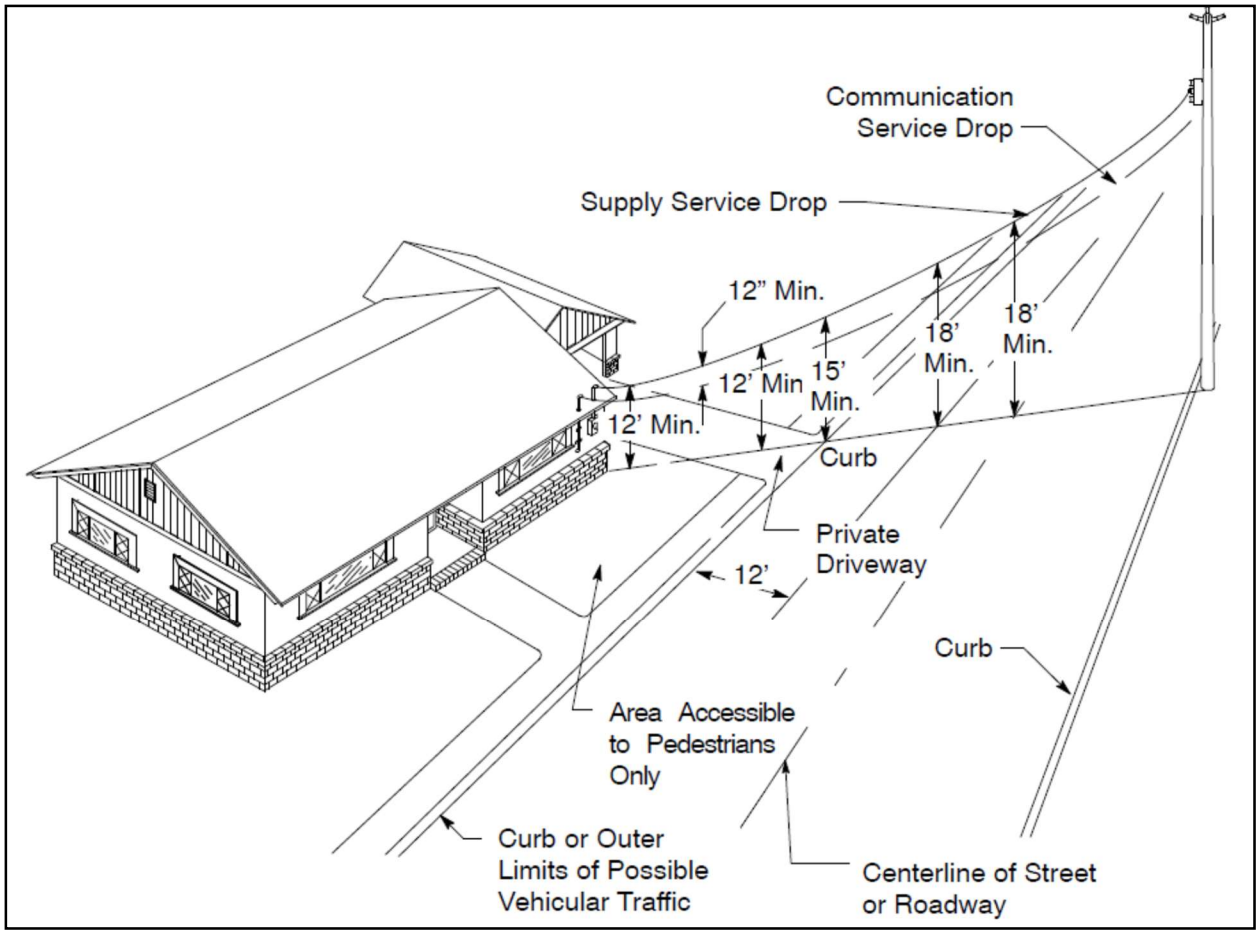
RESIDENTIAL OVERHEAD ELECTRICAL SERVICE UPGRADE

This is not an all-inclusive list and additional items may be required as determined during the inspection.

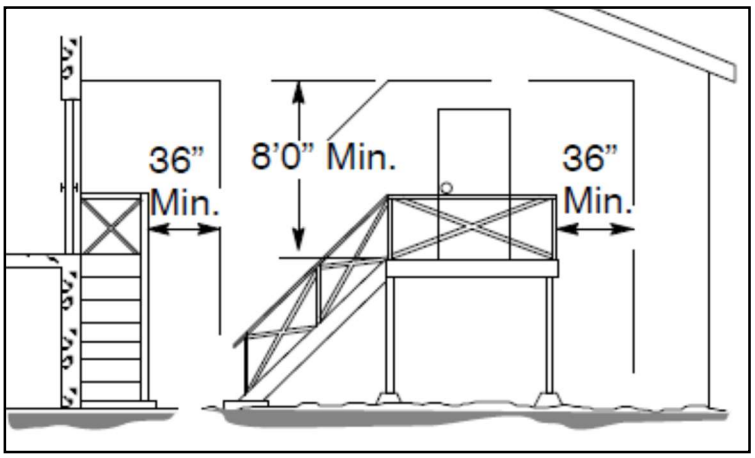
A	Riser max. 18” behind wall facing service line. Brace riser if over 30” high. Service knob 12 over roof
B	48” max service conductor run over roof
C	Maximum distance 18” beyond the last strap. (no couplings)
D	36” minimum distance from window openings (12” over window)
E	10’ from walking surface, 12’ over driveways and 18’ over roadways
F	“Weaver style clamp” for grounding conductor connection to first 5 feet of water main.
G	Grounding Electrode (#6 copper conductor for services less than 200 amps, #4 for 200 amps)
H	“Acorn clamp” connection grounding electrode to 8’ long grounding rod. 1/2”for services less than 200 amps, 5/8” for 200 amps)
I	6’-7” max height for service disconnect.
J	Meter socket located between 48”min and 75” max from grade.



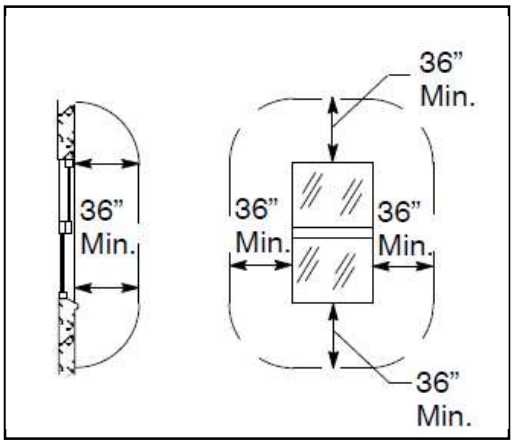
SERVICE CONDUCTOR GROUND CLEARANCES



SERVICE DROP CLEARANCES



Clearances from doors and decks



Clearances from windows

SERVICE DROP CLEARANCES TO BUILDINGS

	Minimum Clearance From Buildings Insulated Conductors (See Note 1) 0 Volts Through 750 Volts
Vertical Clearances Above:	
1. All portions of buildings including metallic or nonmetallic cornices, decorative appendages, eaves, roofs, or parapet walls of the building being served.	See Notes 2 and 3
2. Metallic or nonmetallic, "nonwalkable" overhang, patio cover, or other structure.	See Notes 2 and 3
3. Other buildings on the same premises.	2 Feet
4. Buildings on other premises.	8 Feet (See Note 4)
Horizontal and Radial Clearances:	
1. From fire escapes, exits, windows, and doors.	3 Feet

1 Weather-resistant, covered conductors are ***not*** used in new installations.

2 Not less than 1/2 inch.

3 An applicant must ensure that the service drop's point of attachment for industrial and commercial premises is no more than 18 inches. Take this measurement from ***behind*** the front face of the building wall facing the pole line from which the service drop originates.

4 Reduce to 2 feet for nonmetallic roofs when the roof slope exceeds 9 inches of rise per 12 inches of run. (See Figure 4-4, "Nonmetallic Roof," below.)

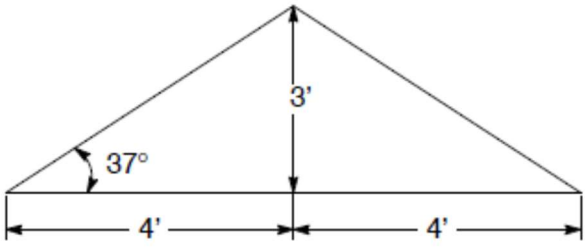


Figure 4-4
Nonmetallic Roof

Chapter 9 GAS UTILITY RELEASE

Once the project is at FINAL and no other work is to take place for the project. A Gas utility release inspection is required to formally release the Gas Utility to PG&E. A gas test will be required to release the gas utility to PG&E.

RESIDENTIAL GAS DELIVERY SYSTEM INSTALLATION & SIZING

The information provided in this brochure answers a number of commonly asked questions. For additional information please refer to the California Plumbing Code or speak with one of the City's Building Inspectors.

☐	Plumbing permit must be obtained prior to the installation, alteration or repair of a gas piping system.
☐	All pipe used for the installation, extension, alteration, or repair of any gas piping shall be standard weight Schedule 40 wrought iron or steel (galvanized or black)
☐	Corrugated stainless steel tubing. Approved PE pipe may be used in exterior buried piping systems when installed by certified technicians.
☐	An exterior shutoff valve shall be installed before the line enters the building
☐	Sediment traps must be installed on furnaces, wall heaters, boilers and water heaters downstream of shutoff valves.
☐	Corrugated stainless steel systems should be bonded to the electrical service grounding electrode system where it enters the building
☐	Gas piping shall not be used as a grounding conductor or electrode but it may be bonded.
☐	Steel pipe installed outside and underground shall have no less than 12 inches of cover (where no damage is likely). And no less than 18 inches of cover in other areas.
☐	Where unions are necessary, right and left nipples and couplings shall be used. Ground joint unions may only be used at exposed fixtures, appliance, or equipment connections and in exposed exterior locations immediately on the discharge side of a building shutoff valve. OMC15.04.940
☐	An accessible shutoff valve shall be installed in the fuel supply piping outside of each appliance and ahead of the union connection thereto, in addition to any valve on the appliance. Shutoff valves shall be in the same room as the appliance and no further than 6 feet from the appliance.
☐	INSPECTION 1: Underground exterior gas piping requires one inspection which will occur after the pipe has been installed in a trench and pressurized but before it is covered.
☐	INSPECTION 2: After the piping system has been installed but prior to it being covered or concealed, or any fixture or appliance has been attached thereto. This inspection will check for proper pipe size, material, and installation. Although not required, it is recommended that the piping system be pressurized.
☐	INSPECTION 3: consists of a pressure test and occurs after the building is completely enclosed but prior to connecting any equipment or appliances. *For projects in which the gas piping will remain exposed, both inspections would be combined into a single inspection.*
☐	Gas piping systems will be pressure tested at least once during the inspection process. The permit holder shall provide and install a temporary pressure gauge and to pressurize the piping system. All gas piping systems shall be pressurized using air, CO2, or nitrogen. For residential installations the gas piping system shall be pressurized to no less than ten (10) psi. and shall hold that pressure for no less than 15 minutes. The gauge used for the pressure test shall have a pressure range not greater than twice the test pressure applied and shall have 1/10 psi increments. OMC 15.04.950 , OMC15.04.955
☐	Gas pipe needs to be sized correctly. You can size the gas pipe by following the example in this handout or you may request assistance from a Building Inspector. For the Building Inspector to help, you must provide a piping layout (similar to Figure “C”) with the lengths of all piping and the input demand load of all appliances shown on the drawing. Sizing the pipe will depend on the type of pipe being used.

Gas Pipe Sizing

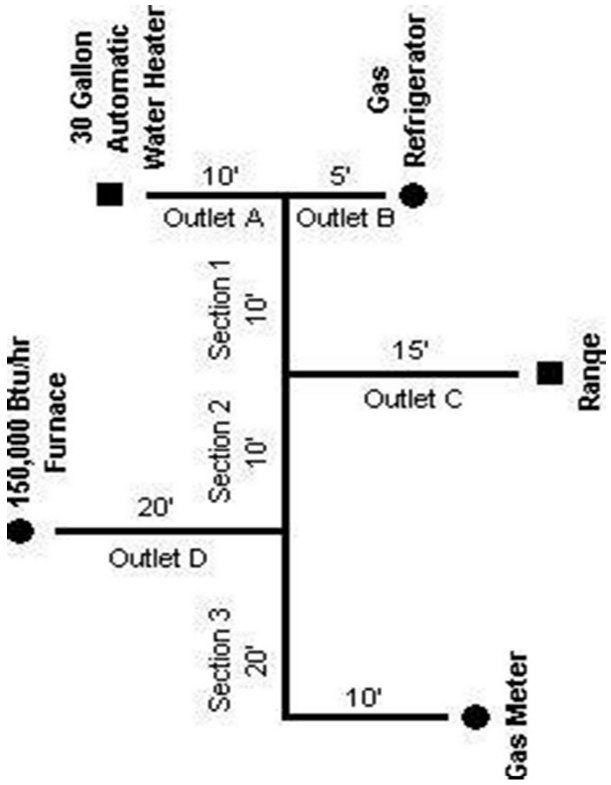


Figure 12-2

TABLE 12-1		
APPLIANCE		INPUT Bth/h
Furnace		100,000
Hydronic boiler		100,000
Water heater, storage 30-40gl		35,000
Water heater, storage 50gl		50,000
Tankless	2 gl/min	142,800
	4 gl/min	285,000
	6 gl/min	428,400
Free standing range		65,000
Built-in cooktop		40,000
Built-in oven or broiler		25,000
Clothes dryer domestic		35,000
Gas fireplace direct vent		40,000
Gas log lighter		80,000
Barbecue		40,000
Refrigerator		3,000

Note: The demand ratings of the appliances listed in this table are minimums. Demand ratings of the actual installed appliances may be higher. Refer to name plate rating on appliance - use the input Btu/Hr number. The tables used to size gas piping are based on Cubic Feet per Hour (CF/H). To convert Btu/Hr to CF/H divide the Btu/Hr by 1,000 (per PG&E delivery capacity), which is the number of Btu/Hr in a single cubic foot of natural gas

Solution:

(1) -Maximum gas demand of **outlet A**- 35 cubic feet per hour (actual input/1000) (from Table 12-1)
-Maximum gas demand of **outlet B**- 80 cubic feet per hour (actual input/1000) (from Table 12-1)
-Maximum gas demand of **outlet C**- 65 cubic feet per hour (actual input/1000) (from Table 12-1)
-Maximum gas demand of **outlet D**- 100 cubic feet per hour (actual input/1000) (from Table 12-1)

(2) The length of pipe from the gas meter to the **most remote outlet** (**outlet A**) is 60 feet.

(3) **Using the length in feet column row marked 60 feet in Table 12-8**:
Outlet A, supplying 35 cubic feet per hour, requires one-half (1/2) inch pipe.
Section 1, supplying **outlets A and B**, or 115 cubic feet per hour requires three-quarter (3/4) inch pipe.
Section 2, supplying **outlets A, B, and C**, or 180 cubic feet per hour requires one (1) inch pipe.
Section 3, supplying **outlets A, B, C, and D**, or 280 cubic feet per hour, requires one & one-quarter (1-1/4) inch pipe.

(4) Using the column marked 60 feet in Table 12-8 (no column for actual length of 55 feet).
Outlet B, supplying 80 cubic feet per hour, requires three-quarter (3/4) inch pipe.
Outlet C, supplying 65 cubic feet per hour, requires three-quarter (3/4) inch pipe.

(5) Using the column marked 60 feet in Table 12-8:
Outlet D, supplying 100 cubic feet per hour, requires three quarter (3/4) inch pipe.

LONGEST LENGTH METHOD- STEEL PIPE					
				Demand CF/Hr	
Outlet	Appliance	Length ft	Demand BTU table 12-1	/1000 BTU/CUFT	Pipe Size table 12-8
A	30gl water heater	**60** (use on 12-8)	35000	35	1/2
B	Gas log lighter	55	80000	80	3/4
C	Range	55	65000	65	1/2
D	Furnace	50	100000	100	3/4
Section					
1	A+B			115	3/4
2	A+B+C			180	1
3	A+B+C+D			280	1-1/4

CORRUGATED STAINLESS STEEL

TABLE 1215.2(14)
CORRUGATED STAINLESS STEEL TUBING (CSST) [NFPA 54: TABLE 6.2(o)][1,2]

									GAS:		NATURAL			
									INLET PRESSURE:		LESS THAN 2 psi			
									PRESSURE DROP:		0.5 in. w.c.			
									SPECIFIC GRAVITY:		0.60			
	TUBE SIZE (EHD)[3]													
FLOW DESIGNATION :	13	15	18	19	23	25	30	31	37	39	46	48	60	62
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR													
5	46	63	115	134	225	270	471	546	895	1037	1790	2070	3660	4140
10	32	44	82	95	161	192	330	383	639	746	1260	1470	2600	2930
15	25	35	66	77	132	157	267	310	524	615	1030	1200	2140	2400
20	22	31	58	67	116	137	231	269	456	536	888	1050	1850	2080
25	19	27	52	60	104	122	206	240	409	482	793	936	1660	1860
30	18	25	47	55	96	112	188	218	374	442	723	856	1520	1700
40	15	21	41	47	83	97	162	188	325	386	625	742	1320	1470
50	13	19	37	42	75	87	144	168	292	347	559	665	1180	1320
60	12	17	34	38	68	80	131	153	267	318	509	608	1080	1200
70	11	16	31	36	63	74	121	141	248	295	471	563	1000	1110
80	10	15	29	33	60	69	113	132	232	277	440	527	940	1040
90	10	14	28	32	57	65	107	125	219	262	415	498	887	983
100	9	13	26	30	54	62	101	118	208	249	393	472	843	933
150	7	10	20	23	42	48	78	91	171	205	320	387	691	762
200	6	9	18	21	38	44	71	82	148	179	277	336	600	661
250	5	8	16	19	34	39	63	74	133	161	247	301	538	591
300	5	7	15	17	32	36	57	67	95	148	226	275	492	540

For SI units: 1 inch= 25 mm, 1 foot= 304.8 mm, 1 cubic foot per hour= 0.0283, m^3 /h, 1 pound-force per square inch= 6.8947 kPa, 1 inch water column = 0.249 kPa

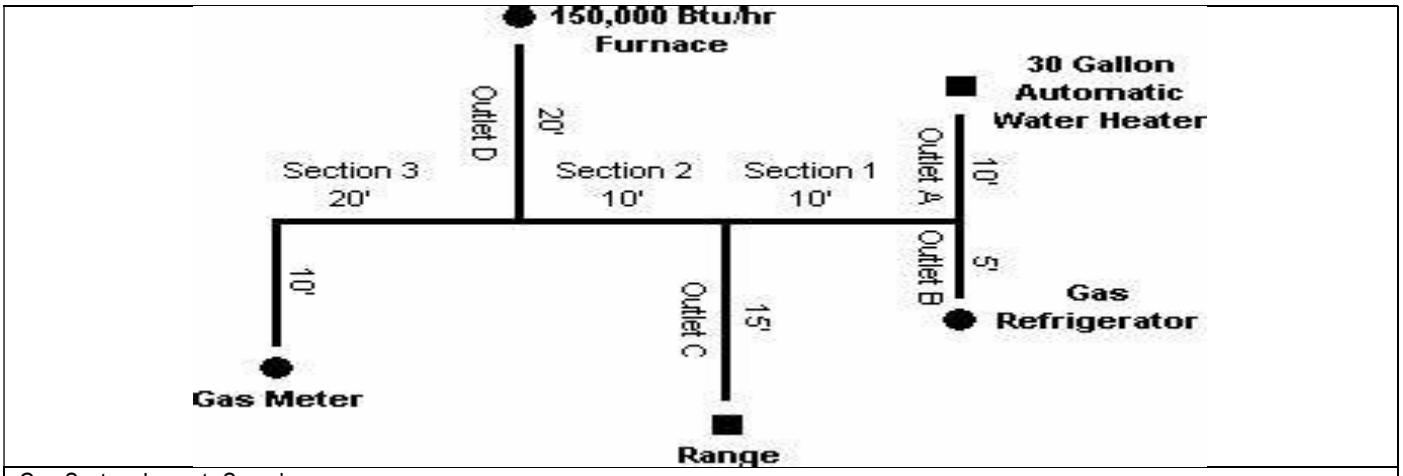
Notes:

[1] Table entries are rounded to 3 significant digits.

[2] Table includes losses for four 90 degree (1.57 rad) bends and two end fittings. Tubing runs with larger numbers of bends, fittings, or both shall be increased by an equivalent length of tubing to the following equation: L = 1.3 n, where L is additional length (ft) of tubing and n is the number of additional fittings, bends, or both.

[3] EHD = Equivalent Hydraulic Diameter, which is a measure of the relative hydraulic efficiency between different tubing sizes. The greater the value of EHD, the greater the gas capacity of the tubing.

GAS DELIVERY SYSTEM SIZING WORKSHEET



Gas System Layout- Sample

TABLE 12-1		
APPLIANCE		INPUT Bth/h
Furnace		100,000
Hydronic boiler		100,000
Water heater, storage 30-40gl		35,000
Water heater, storage 50gl		50,000
Tankless	2 gl/min	142,800
	4 gl/min	285,000
	6 gl/min	428,400
Free standing range		65,000
Built-in cooktop		40,000
Built-in oven or broiler		25,000
Clothes dryer domestic		35,000
Gas fireplace direct vent		40,000
Gas log lighter		80,000
Barbecue		40,000
Refrigerator		3,000

Note: The demand ratings of the appliances listed in this table are minimums. Demand ratings of the actual installed appliances may be higher. Refer to name plate rating on appliance - use the input Btu/Hr number. The tables used to size gas piping are based on Cubic Feet per Hour (CF/H). To convert Btu/Hr to CF/H divide the Btu/Hr by 1,000 (per PG&E delivery capacity), which is the number of Btu/Hr in a single cubic foot of natural gas

GAS:	NATURAL
INLET PRESSURE:	LESS THAN 2 psi
PRESSURE DROP:	0.5 in. w.c.
SPECIFIC GRAVITY:	0.60

	PIPE SIZE (inch)													
NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4	5	6	8	10	12
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026	5.047	6.065	7.981	10.020	11.938
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR													
10	172	360	678	1390	2090	4020	6400	11 300	23 100	41 800	67 600	139 000	252 000	399 000
20	118	247	466	957	1430	2760	4400	7780	15 900	28 700	46 500	95 500	173 000	275 000
30	95	199	374	768	1150	2220	3530	6250	12 700	23 000	37 300	76 700	139 000	220 000
40	81	170	320	657	985	1900	3020	5350	10 900	19 700	31 900	65 600	119 000	189 000
50	72	151	284	583	873	1680	2680	4740	9660	17 500	28 300	58 200	106 000	167 000
60	65	137	257	528	791	1520	2430	4290	8760	15 800	25 600	52 700	95 700	152 000
70	60	126	237	486	728	1400	2230	3950	8050	14 600	23 600	48 500	88 100	139 000
80	56	117	220	452	677	1300	2080	3670	7490	13 600	22 000	45 100	81 900	130 000
90	52	110	207	424	635	1220	1950	3450	7030	12 700	20 600	42 300	76 900	122 000
100	50	104	195	400	600	1160	1840	3260	6640	12 000	19 500	40 000	72 600	115 000
125	44	92	173	355	532	1020	1630	2890	5890	10 600	17 200	35 400	64 300	102 000
150	40	83	157	322	482	928	1480	2610	5330	9650	15 600	32 100	58 300	92 300
175	37	77	144	296	443	854	1360	2410	4910	8880	14 400	29 500	53 600	84 900
200	34	71	134	275	412	794	1270	2240	4560	8260	13 400	27 500	49 900	79 000
250	30	63	119	244	366	704	1120	1980	4050	7320	11 900	24 300	44 200	70 000
300	27	57	108	221	331	638	1020	1800	3670	6630	10 700	22 100	40 100	63 400

OUTLET	LENGTH (from meter)	INPUT (12-1/1000)	PIPE SIZE (from 12-8)	LONGEST (use next higher in 12-8)

SECTION	INPUT (i.e. a+b)	INPUT (total)	PIPE SIZE (from 12-8)	

Chapter 10 FINAL INSPECTION

The FINAL inspection takes place once no other work is contemplated for the project. The FINAL inspection typically will require that the permittee/ building professional conduct a thorough walk-through of the project prior to calling for inspection. The permittee/ building professional shall ensure that all flooring, transitions, light switches, outlets, covers, lights, handrails, guardrails, cabinetry and related hardware, appliances with manufacturer literature, address, etc are installed and completed. The permittee/ building professional, shall also have all FINAL paperwork available for the inspector, this can include: Final Wet-Signed/Wet-Stamped Special Inspection letter from Project Engineer, Private Sewer Lateral Certificate from EBMUD, PGE lock-out tags on Electrical Meters, Reduced set of floor plans (11x17), HERS Certification for Mechanical systems as required by California Energy Code, California Green Code Residential Mandatory Measures certified checklist, any other project specific document.

RESIDENTIAL FINAL (TYPICAL MINIMUM REQUIREMENTS)

Prior to this inspection, all required sequential inspections and correction notices must be completed.

This is not an all-inclusive list and additional items may be required as determined during the final inspection.

FINAL INSPECTION CHECKLIST		
GENERAL		
☐	Construction site is safe for inspection. All trash, debris are removed from site. If required, landscape work is complete per zoning.	
☐	Approved plans and permit card are on the jobsite. CRC. R106.3.1 &105.7R106.3.1 & R105.7	
☐	Building must have power for testing circuits and circuit tester.	
☐	Provide safe and adequate size ladder(s) for roof and attic inspection. Ladder shall extend a min. of 36" above roof edge and be full height to attic access scuttle.	
PERMITS, PLANS AND DOCUMENTATION		
☐	All revisions submitted, approved and attached to plans & plan check fees paid.	
☐	Required signoffs from other departments (Public Works, Planning, Engineering and Fire Department)	
☐	Fire Sprinklers final inspection completed by Fire Department.	
☐	Verify Final Plumbing, Mechanical and Electrical inspections are approved Verify compliance with approved plans and required sequential inspections are signed off.	
☐	Provide original copies of correctly filled out CF-2R Installation Certificate forms for the field inspector at or prior to the final inspection.	
☐	Required Energy Efficiency Standards Compliance Forms (2019 EES):	
☐	a	Envelope-Insulation; Roofing; Fenestration CF-3RENV-01
☐	b	Residential Lighting CF-2R-LTG
☐	c	Domestic Hot Water (DHW) CF-3R -MECH-01
☐	d	Solar Water Heating Systems (SDHW) CF-2R-STH-01
☐	e	Pool and Spa Heating Systems CF-2R-PLB-03
☐	f	Space Conditioning SystemsDuctsandFansCF-3R-MECH
☐	g	Indoor Air Quality and Mechanical Ventilation CF-3R MCH-27-A-H -
	h	Solar PV System CF2R-PVB-01-E
☐	Provide completed HERS Certificates of Field Verification and Diagnostic Testing as required by the approved Title 24 Report or per the requirements outlined under the prescriptive methods in the 2019 Residential Compliance Manual.	
☐	Provide Pex / CPVC water piping certification that meet the flushing and tagging procedures. CPC 604.1 (d) Chlorination Report	
☐	Provide Special inspection final reports, Formwork Certification letter, and/or soil report R109.2	
EXTERIOR		
☐	Address numbers shall be placed on house, plainly legible and visible from the street or road fronting the property, Numbers shall contrast with background. Numbers shall be Arabic numerals	

	or alphabetical letters with a min. height of 4" and min. 1/2"stroke width and shall be contrasting with their background. R 319 .1
☐	All penetrations of exterior finish are to be sealed or properly screened for insects and weather protection including but not limited to electrical lines, cable, water and gas pipes, AC condenser lines. R703
☐	Backflow preventers or vacuum breakers shall be installed at hose bibs (603.5.7) & on landscape piping (603.5.6) and Plumbing fixtures (603.5.19). Plumbing fixture fittings with integral backflow protection shall comply with ASME A112.18.1/CSA B125.1
☐	Electrical outlets: Minimum of one accessible grade level GFI protected outlet in front and one in rear of the dwelling not more than 6 1/2' ft. above grade CEC 210.52 (E) (1)
☐	Water pressure regulator required when water pressure exceeds 80 PSI. and shall be approved type with an adequate strainer. CPC 608.2
☐	Clean outs: install cleanout within 2' feet of building and extended to grade with approved fittings. CPC 715.1
☐	Wood siding, sheathing and wall framing clearance from the ground shall not be less than 6" inches unless sheathing and wall framing are naturally durable or pressure-preservative-treated wood. R317.1 Exterior Stucco/plaster weep screed clearance shall be a min. of 4" inches above the earth or 2" inches above paved area. R703.7.2.1
☐	Lighting: All exterior lighting mounted to the building or to other buildings on the same lot shall be high efficacy luminaries, controlled by a manual ON and OFF switch that permits the automatic actions and controlled by a photocell and either a motion sensor or an automatic time switch control: or controlled by an astronomical time clock control and shall be listed for damp or wet location. Caulked seal around light fixtures is required. CEC406.9(B) & California Energy Code 150.0(k)3
☐	Receptacles in a wet location shall be GFCI and in an enclosure that is weatherproof whether or not the attachment plug cap is inserted. (Bubble cover) CEC 406.9
SAFETY GLAZING- AS REQUIRED BY CRC R308	
☐	Where edge of door is less than 24" from door edge and less than 60" above ground. R308.4.2 (1) & (2)
☐	When glass is more than 9 sq. ft .and the bottom edge of glass is less than 18" above floor and the top edge of the glass is more than 36 d and within 36" inches of the walking surfaces. R308.4.3 (1) (2) (3) & (4)
☐	When glass is within 60" inches of the water's edge of a bathtub, hot tub, spa, whirlpool or swimming pool or from the edge of a shower, sauna or steam room. R308.4.5
VENT AND CHIMNEY TERMINATION	
☐	Chimney(s) terminations must be 2' feet above any roof/structure within 10' feet , but shall not be less than 3'feet above the highest point where the chimney passes through the roof. CRC R1003.9 R1003.9
☐	Spark arrester shall be approved, screened, accessible and removable for cleaning. Architectural Shroud(s) are not allowed unless listed as part of the fireplace. R1003.9.2 (1) (2) (3) & (4)
☐	Dryer exhaust duct termination: Duct shall terminate independently to the outside and be equipped with an approved back-draft damper (no screens) shall be listed for roof (horizontal) or wall (vertical) termination. CMC 504.4

☐	Environmental air duct exhaust such as hoods, dryer and bathroom vents shall terminate a min. of 3' from property line and 3'feet from openings into a building. CMC502.2.1
☐	Gas appliance vents 12" inches or smaller shall terminate a min. of 12" inches above any portion of a building within 10'feet horizontally when 6:12 or flatter. Vents shall be at least 8' feet from a vertical wall. All other vents shall terminate a min. of 2' feet above the highest point where they pass. Exception: Direct-Vent CMC 802.6.1 (1) & (2)
☐	Waste vents shall terminate vertically not less than 6" above roof, nor Less than 1' from any vertical surface and 10' from or 3' above any opening such as windows, doors, air intake, nor less than 3' from any lot line. Side wall vent may not terminate under a vented soffit. CPC 906.1 & 906.2
ROOF	
☐	All roofing materials have been properly installed per manufactures specifications, including step-flashings, counter flashings, and "crickets or splitters" behind chimneys as required. R901.1
☐	Provide leaf guards at gutters R337.5.4
☐	Paint all ABS/Plastic vent pipes. IAPMO Installation standards CPC 312.4
FLAT ROOF/BALCONY DRAINS	
☐	Primary drain(s) shall be properly sized CPC 1101.12.1
☐	Secondary drain(s) shall be the same size as the primary drain with the inlet flow line 2" above the low point of the roof and shall be an independent system OR overflow scupper(s) shall be installed with the inlet flow line located 2" above the low point of the roof and the scupper opening a min. of 4" high and have a width equal to the circumference of the primary drain. Overflow drains shall not be connected to the primary drain. CPC 1101.12.1 & 1101.12.2.2 & 1105.1
☐	Min. ¼" per foot slope to drain CPC Table 1103.2
☐	Strainer(s) for flat deck primary drain(s) shall be level with the deck with the inlet area not less than 2 times the area of the drainpipe. Not Mentioned In CPC 2019
☐	Strainer(s) for all flat roof secondary drain(s) shall be a min. of 4" above with the inlet area not less than 1-1/2 times the size of the inlet pipe. Not Mentioned In CPC 2019
GRADING AND DRAINAGE	
☐	Site Grading and Drainage per approved plan. Drainage away from foundation shall be a min. slope of 5% for 10'. R401.3 Verify clearance: 8" from earth to wood, 4" from earth to stucco & 2" from concrete to stucco R317.1
VENTILATION	
☐	Indoor Air Quality and Mechanical Ventilation for all new dwellings and additions larger than 1,000sq.ft. All bathrooms require a minimum 50cfm 3-sone. Kitchen requires minimum 100cfm. 3-Sone. 2016 California Energy Code CMC 402.1.2
☐	Roof/Attic: Min. net free ventilation 1/150 sq. ft. of area with 50% at upper portion a min. of 3' above eave or cornices vents and the balance ventilation provided by eave or cornice vents. Openings to attics shall be covered with corrosion-resistant wire mesh were mesh openings are a min. of 1/16" not to exceed 1/8". R806.1 & 806.2
☐	Under-floor: Min. net free ventilation 1/150 sq. ft. of area and placed to provide cross ventilation of under-floor space. Openings shall be covered with corrosion-resistant wire mesh with mesh openings not exceeding 1/8" openings. R408.1
EXTERIOR GAS PIPING	

☐	Gas pipe passing through outside wall is protected against corrosion by coating, wrapping or sleeve, caulk around sleeve. CPC 1210.1.5 & 1210.2
☐	Gas meters, valves, and equipment are protected from damage. CPC 1208.7.1.1
GARAGE	
☐	Receptacle outlet: A minimum of one receptacle outlet is required in garages with electrical power. CEC 210-52 (G) (1)
☐	GFCI protection at all electrical receptacles. CEC 210.8 (A) (1) through)10) & Exceptions & CEC 210.52
☐	Exposed electrical cable within 8' from the floor shall be protected with rigid metal conduit electrical metallic tubing, or schedule 80 PVC rigid nonmetallic conduit or other approved means. CEC 334.15 (A) (B) & (C) 8'?
☐	Gas appliances shall be protected from vehicular traffic with bollards (i.e. gas water heater, furnace, dryer) CPC 507.13.1 & CMC 305.1.1
☐	Attached and detached garage shall have at least (1) switch-controlled light. Lighting shall be high efficacy OR occupant sensor CEC 210-70 (A) (1) Exceptions 1 & 2. & (2) (1) (2)
☐	No openings are allowed between garage and sleeping rooms. .5.1
☐	Door between house and garage to be 1-3/8" solid core or honeycomb-core steel 20-minute fire-rated door equipped with self-closing or automatic-closing and self-latching device. CRC 302..5
ELECTRICAL	
☐	Circuit breakers shall be listed for the panel in which these are installed. CEC110.3
☐	
☐	Oxide inhibitor applied to aluminum conductor terminations in lugs/breakers. CEC 110.14
☐	Double lugging shall be permitted only if lug is listed for the number, type and simply of conductors, and does not interfere with the proper functioning of the conductors. CEC 110.14. CEC 110.14
☐	Verify wire size (ampacity) complies with CEC 310.15 and applicable tables.
☐	Main panel grounds and neutrals shall be on the same bus bar, or if on separate bus bars, the bus bars must be connected by a bonding jumper the same size as GEC. ?
☐	Sub panel grounds and neutrals shall be on a separate bus bar?
☐	Unused K/O, breaker slots and openings to be closed by listed breaker slot cover or breaker labeled "SPARE" or "UNUSED " CEC110.12(A) & 408.7
☐	Provide proper phasing for multi wire branch circuits.
☐	Service panels with more than 6 main disconnects requires a separate main breaker. CEC230.71
☐	Panel boards at separate structures require a main disconnect and grounding electrode system. CEC 250.32
☐	Dedicated circuit for furnace CEC422.12
☐	Dedicated circuit for (built- in) microwave
☐	Dedicated circuit for heated Hydro-Massage bathtub motors.
☐	Min. (2) 20-amp small appliance circuits @ kitchen & dining, pantry & breakfast areas CEC 210.52 (B)
☐	Min. (1) 20-amp circuit for laundry receptacle CEC 210.11 (C) (2)
☐	Min. (1) 20-amp circuit for bathrooms receptacles CEC 210.11 (C) (3)
☐	Bedrooms, Family Rooms, Dining Rooms, Living Rooms, Parlors, Libraries, Dens, Sunrooms, Recreation Rooms, Closets, Hallways or similar rooms or areas. Lighting, receptacle outlets and smoke/CO detector circuits shall be protected with a Combination type AFCI breaker or other

	approved means and shall be independently identified/labeled as such. CEC 210-12 (A) as amended by OMC 15.04.3.3005
☐	Verify labeling of circuits for main and Sub-panel. CEC 110.22
☐	Handle tie at garbage disposal and dishwasher for single yoke. CEC 210.4
☐	Grounding electrode and GEC per applicable codes. CEC 260.66
☐	Supplemental ground to water gas metal piping service CEC 268
☐	Main disconnect 6'-7" from top of handle to floor/grade and location is readily accessible clearance of 36" deep x 30" wide x 78" in height. CEC 404.8, Table 110.26 (A) (1) & 110.26 (A0 (2) (3)
☐	Overcurrent devices shall be readily accessible. CEC 240.24
☐	Internal parts/equipment shall not be damaged and free of contaminates CEC 110.12
☐	Electrical panel shall be clean of debris.
GUARDS AND HANDRAILS	
☐	Guards are required along open-sided walking surfaces 30" above grade/floor. R312.1.1
☐	Guard height: Guards shall not be less than 42" high measured vertically above the leading edge of the tread except when stair handrail is the guard then min. height 34" and max. height 38 R312.1,2 $ R312.1.2
☐	Handrails shall have a height of not be less than 34" and not more than 38" from the sloped plane adjoining the tread nosing, terminate in newel posts, volute, or return to wall . R312.1.2 Exceptions 1 & 2
☐	Load: Handrail assemblies and guards shall resist a single concentrated load of 200 pounds. (keep code section) & Reference Table R301.5
☐	Grasp ability: circular handrail shall be Min. 1-1/4" Max. 2" diameter. Non-circular handrails must have a perimeter of 4" min. and 6-1/4" max. with a max. cross dimension of 2-1/4". R311.7.8.5 (1) & (2)
☐	Handrails are required on one side with four or more risers. R311.7.8
☐	Clear space between handrail and wall a min. of 1-1/2". R311.7.8.3
☐	Projection: Handrail projection into stairway a max. of 4-1/2". .R311.7.8.2
☐	Openings: guards shall not allow a 4" sphere to pass through. R312.1.3
☐	Openings: guard rails on the side of stair treads shall not allow a 4-3/8" sphere to pass through and the triangular opening at bottom of tread & riser shall not allow a 6" sphere to pass through. R312.1.3 & Exceptions 1 & 2
STAIRWAYS	
☐	Width: Stairway width shall not be less than 36" R311.7.1
☐	Headroom: Min. 6'-8" (Spiral 6'-6") R311.7.2
☐	Treads and risers: Maximum riser height shall be 7-3/4" and a minimum of 4" Minimum tread depth shall be 10" with a min. ¾" nosing or 11" depth. R311.7.5.1 & R311.7.5.2
☐	Nosing: max. radius of curvature or beveling of nosing ½". Risers shall be solid and require nosing min. 3/4" max. 1-1/4" except when tread depth is 11" nosing is not required. R311.7.5.3
☐	Dimensional uniformity at stairs shall be determined from landing to landing from the tallest riser not more than 3/8" to the shortest riser and greatest tread depth not more than 3/8" more than the smallest. R311.7.5.1
☐	Winders: Min. 6" tread depth at inner edge and min. 10" tread depth within 12" of inner edge. R311.7.5.2.1 & Exception
☐	Doors are permitted to open at the top step of an interior flight of stairs, provided that the door does not swing over the stairs. . R311.7.6 Exception

☐	Stairway landing there shall be a landing at the top and bottom of each stairway. The width of landings shall not be less than the width of the stairway they serve. Every landing shall have a stairway dimension measured in the direction of travel with a min. 36" R311.7.6
☐	Vertical rise: Max. 151" between floor levels or landings. R311.7.3
☐	Lighting is required on tread runs not less than 1 foot-candle. Were one or more lights are installed for stairway provide a wall switch at each floor level and landing level that includes an entry (fluorescent or push button control occupant sensor) R303.7
☐	Safety glass required in walls enclosing stairway landings or within 5' of the bottom and 3'from the nose of the top of the stairway where the bottom edge of the glass is less than 60" above a walking surface. R308.4.6 & R308.4.7
EXTERIOR STAIRWAY LOCATIONS	
☐	Outdoor stairways and landings shall be designed to shed water. CRC 311.3 & 311.7.7
☐	Lighting is required at all landings at exit doors and tread runs at stairways. CRC 303.7 & Exception & 303.8 (photo control / sensor combination) Shielded 1" below the bulb. (no flood lighting) OAK
THRESHOLD CLEARANCE TO LANDING	
☐	Door swings out over landing: Max. threshold height above exterior landing 1½" R311.3.1
☐	Door swings in or slider: Max. threshold height above exterior landing 7¾" R311.3.1 Exception
LANDINGS	
☐	Exterior landings at doors: The width shall not be less than the width of the stairway or door, whichever is greater. Landing length in direction of travel shall be a min. of 36". Outdoor stairways and landings shall be designed to shed water a min ¼" per foot away from house. R311.3
☐	Landings at exterior doorways shall not be more than 7.75" below the top of the threshold, provided the door does not swing over the landing. R311.3.1 Exception
☐	Landings for other than the required egress door are not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway. R311.3.2 Exception
INTERIOR	
☐	Ceiling height in all habitable spaces shall be no less than 7'. R305.1
☐	All receptacles and switches shall be complete with plates. delete
UNDER-FLOOR CRAWL SPACE	
☐	Under floor foundation access crawl hole openings min. 18"x24" (pipes, ducts and other nonstructural construction shall not interfere with the accessibility to or within under-floor areas.) R408.4
☐	Remove all debris from crawl space. R408.5
KITCHEN	
☐	Ceiling height shall be min. R305.1
☐	Listed airgaps shall be provided for dishwasher on discharge side and be mounted on counter top. CPC 807.3
☐	Check that sink cleanout is accessible. CPC 707.0
☐	All receptacles serving the countertop shall be GFCI protected CEC 210.8
☐	Wall countertop receptacles shall be spaced max. 48" on center and within 24" from edge of the sink and counters. CEC 210.52 (C)(1)
☐	Counter tops 12" or more in width require a receptacle outlet. 210.52 (C) (1)
☐	Islands and peninsulas shall be provided with a min. of (1) receptacle. CEC 210.52(C) (2) & (3)

☐	Outlets shall not be mounted over 20” above countertop nor more than 12” below counter. CEC 210.52 (C) (5) & Exception to (5)
☐	Provisions for range must be present either as a capped off gas line or a 220-volt outlet installed in wall. If stove is to be wired directly, it shall be hooked up for inspection.
☐	Kitchen range clearance to combustibles shall have a vertical clearance of 30” unless protected by ¼” insulating millboard or metal hood, then the clearance can be reduced to 24”. Gas range must have approved anti-tip installed. CMC920.3.2
☐	Range hood exhaust duct shall terminate outside, shall have a 3’ clearance to windows and doors and other openings, shall be airtight and be equipped with a back draft damper. Ducting shall be galvanized steel, stainless steel, or copper, with a smooth interior finish. CMC504.3If the hood vent is used for indoor air quality, mechanical ventilation, required by 2016 California Energy Code150(o),150.2(a)1C, and 150.2(a)2C
☐	Shut-off valve shall be accessible rigid piping upstream from the flexible connector and within 6’ of the gas appliance. CPC 1212.6
☐	Gas appliance connectors shall not extend from one room to another or passthrough any walls, ceilings, floors, partitions, or appliance housing. Verify that connector is the properly sized and listed for the appliance it serves. (See BTU rating on connector tag.) CPC1212.5.3
☐	Junction boxes shall be accessible and have working clearance.
☐	Recessed lights shall be IC rated. All luminaires shall be high efficacy or JA8-2019 mark EES 150.0(k)1A
WET BARS	
☐	GFCI protection required for receptacles located within 6’ of wet bar sink edge. CEC 210.8 (A) (7)
BEDROOMS	
☐	Smoke alarms shall be interconnected, hardwired with battery backup, are required on ceiling or wall at each floor level, in each bedroom and outside each sleeping area. R314.4
☐	Carbon Monoxide Alarms shall be installed in dwellings with fuel burning appliances and with attached garages. Detectors shall be interconnected. Detectors shall be installed in each sleeping room and outside each sleeping room area and every floor level including basements, multiple purpose smoke and carbon monoxide alarms are acceptable. R315.3 & R315.5
☐	Bedrooms, Basements, and Habitable attics window egress min. clear height 24”, min. clear width 20”, min. 5.7 sq. ft. open able area except at grade floor may be 5.0 sq. ft. Max. net opening height 44” clear space to floor. R310.2.1 & Exception
☐	Switched Lighting shall be high efficacy (Fluorescent Or occupant sensor OR dimmer). Closets that are less than 70 sq. ft. are exempt from this requirement. 2019 EES 150(k) 2 F, & 110.9. Occupancy sensing controls with at least one luminaire in each bathroom, laundry room, garage and utility rooms.
☐	Closet light clearances: Surface incandescent lights shall be fully enclosed and a min. of 12” clearance from storage/shelf area. Fluorescent lights shall be a min. 6” from storage/shelf. Recessed lights in wall or ceiling shall be a min. 6” from storage area. CEC 410.16 (C)(1) (2) (3) (4) (5)
☐	Switched lighting shall be high efficacy (fluorescent, occupancy sensor or dimmer)
☐	The minimum ceiling height in a hallway is 7’. R305.1
☐	The minimum width of the hallway 36” R311.6
☐	Smoke alarms are required on ceiling or wall outside of each separate sleeping room in the immediate vicinity of the bedrooms. (min. 3’ clearance from any air supply or per manufacture instructions) R314.3 (2)

☐	Carbon Monoxide Alarms shall be installed in dwellings with fuel burning appliances and with attached garages. Detectors shall be interconnected. Detectors shall be installed in each sleeping room and outside each sleeping room area and every floor level including casements, multiple purpose smoke and carbon monoxide alarms are acceptable. Delete Duplicate	
☐	Hallways 10' or more in length require min. (1) electric receptacle. CEC 210.52 (H) Min. of (1) switch-controlled light in hallway. (dimmers or fluorescent) CEC 210.70 (2) (1)	
LAUNDRY ROOMS		
☐	Switched lighting shall be high efficacy (occupant sensor).	
☐	The minimum ceiling height in a laundry room is 6 feet 8 inches. R 305.1	
☐	Electric dryer requires 3-wire with ground (4 prong outlet). CEC 250.114	
☐	GFCI protection required for receptacles located within 6' of laundry sink edge. CEC210-8 (A) (7)	
☐	Shut-off valve shall be accessible rigid piping upstream from the flexible connector and within 6' of the gas appliance. CPC 1212.6	
☐	Gas appliance connectors shall not extend from one room to another, through any wall, floor, partition or appliance housing. Verify that connector is the properly sized and listed for the appliance it serves. (See BTU rating on connector tag.) CPC 1212.5.3	
☐	Flexible transition ducts: Shall be listed and approved, not more than 6' long and shall not be concealed within construction. CMC 504.4.2.2	
☐	Dryer duct min. 4" dia. 26 gage metal, smooth interior (no screws), max. 14' long including (2) 90-degree elbows and shall terminate to the outside with a back draft damper. CMC 504.4.2.1	
OMC 15.04.640 The ventilation for a domestic clothes washer and/or dryer located in a closet in a dwelling unit may also comply with the following		
☐	1	Louvers shall be provided on doors to a closet containing a washer and/or dryer.
☐	2	Natural ventilation shall be not less than one twentieth of the total floor area, with a minimum of 1½ square feet. Mechanical ventilation of five air exchanges per hour may be used alternatively
☐	3	A dryer vent installed in accordance with the California Mechanical Code is necessary but is not considered as providing any ventilation required by this section.
BATHROOMS		
☐	The minimum ceiling height in a bathroom is 6 feet 8 inches' . R305.1	
☐	All permanently installed lighting shall be high efficacy and controlled by an- occupancy/vacancy sensor. EES 150 (k) 2 F	
☐	Hanging light fixtures are not allowed within 3' horizontal and 8' vertical from tub and shower. CEC 410.10 (D)	
☐	Bathroom receptacles are to be supplied by at least one 20 amp circuit with no other outlets. Exception, if 20-amp circuit supplies only one bath room, other outlets within the same bath room are allowed on that circuit. CEC 210-11 (C) (3) & Exception	
☐	Light fixtures in shower shall be suitable for damp locations CEC 410.10 (A)	
☐	GFCI protection shall be provided for all outlets in bathrooms, with at least one outlet 36" inches of the outside edge of each basin. CEC 210.8 (A) (1) & CEC 210.52 (D)	
☐	Hydromassage bathtubs motors shall be accessible, on a dedicated circuit with their own GFCI circuit and bonded with min. 8 AWG copper wire. CEC 680.71 & 680.74(B)	
☐	Water closet spaces shall be at least 30 inches wide; 15" min. from wall to center of W/C with at least 24 inches clear in front of the W/C. CPC 402.5	

☐	Water closet base caulked at floor. CPC 402.6.1 All new water closets shall be -- Reference Matrix Adoption Table Chapter 4 & CPC 401.3 & 411.12 = 1.28 Gallons Per Flush
☐	Safety glazing at all windows less than 60" above bottom of tub & shower floor and at tub and shower enclosures panels & door (check for bug) R308.4.5
☐	Shower door or rod shall be installed. delete
☐	Shower enclosure doors shall maintain an unobstructed opening of 22" clearance for egress CPC 408.5
☐	Shower compartment min. 1024 sq. in. encompassing a 30" circle CPC 408.6
☐	Bathrooms install mechanical ventilation that shall terminate outside and be equipped with a back-draft damper. R303.3.1 & R303.4
OTHER WINDOWS	
☐	Openable windows 72" inches or more above exterior grade must be at least 24" above the finished interior floor OR no opening to window that would allow 4" sphere OR install window guards complying with ASTM F 2090CRC 312.2.1 & 312.2.2
WOOD FIREPLACE (NO NEW ALLOWED, ONLY REPAIRS PER OMC 8.19.010**)**	
☐	Verify metal damper is located a min. of 8" above the top of the fireplace opening or at the top of the fireplace opening and is operable from the room containing the fireplace. Damper controls are allowed in the fireplace. R1001.7.1
☐	If the fireplace opening is less than 6 sq. ft, the hearth shall extend a min. of 16" from the front, and min. 8" beyond each side of the fireplace opening. If the opening exceeds 6 sq. ft, the hearth shall extend a min. of 20" from the front and 12" beyond sides. R1001.10
☐	Combustible materials, such as a wood mantel, shall have a min. 6" clearance from fireplace opening and shall not project more than 1/8" for each 1" distance above opening. (Example: you may have a ¾" projection when 6" away from opening). R1001.11 & Exceptions 1 ,2, 3, & 4
☐	Maintain a clearance to combustibles of 2" from masonry on front and sides and 4" on back. The air space shall not be filled. Trim, drywall, and sheathing edges are permitted to abut masonry provided they are 12" min. from inside surface of nearest firebox opening. R1001.11 & Exception #3
☐	Glass doors and screen shall be permanently attached to fireplace opening. Not Mentioned
GAS FIREPLACES	
☐	Shut-off valve shall be accessible rigid piping upstream from the flexible connector and within 6' of the gas appliance CPC 1212.6
☐	Gas appliance connectors shall be used in accordance with the terms of their listing, shall not extend from one room to another, through any wall, floor, partition or appliance housing. Verify that connector is properly sized and listed for the appliance it serves. (See BTU rating on connector tag.) CPC 1212.5.3
☐	Glass doors shall be permanently attached to fireplace opening. CMC 913.3Exception in line flue controller installed per CEC
GARAGE	
☐	GFCI protection is required at all receptacles in garages and unfinished basements. NOTE: Receptacles that are not readily accessible and for appliances not easily moved such as clothes washer, freezer, sump pump are exempt. CEC 210.8 (A) See Exceptions
☐	Attic access required in unoccupied spaces where the clear height is over 30". The access opening shall be a min. 20"x30". R807.1
WATER HEATER	

☐	Minimum insulation wall thickness of 1" the first 5' hot and cold-water pipe. If a recirculation pump is installed the entire hot water system must be insulated. Exception: piping located in the attic that is continuously buried by at least 4" of insulation CPC 609.11 & EES 150.0 (j) (2)
☐	Shut-off valve shall be accessible, installed in rigid piping upstream from the flexible connector and within 6' of the gas appliance. CPC 1212.6
☐	Gas appliance connectors shall not extend from one room to another, through any wall, floor, partition or appliance housing. Verify that connector is the properly sized and listed for the appliance it serves. (See BTU rating on connector tag.) CPC1212.5.3
☐	Gas water heater located in garage shall be elevated 18" above floor unless listed as flammable vapor ignition resistant. CPC 507.13
☐	Seismic strapping within upper 1/3 and lower 1/3 and min. 4" inches above the controls. CPC 507.2
☐	Full-port shut off valve installed on the cold water supply pipe of the water heater CPC 606.2
☐	Combustion air: See "Water Heater" under illustrations in the index for acceptable methods for combustion air and venting. CPC 506.5
☐	Type B (double wall) vent may pass through floors and ceilings with a min. 1" clearance to combustibles or per manufacture listing. Type B vent shall terminate a min. 5' above water heater draft hood. Secure joints with min. 3 screws. CPC 509.10.12 Exception & Table 509.7.3.4 & Listing & 509.6.1
☐	Single wall metal pipe vents no longer allowed CPC 509.7.3
☐	Water heater shall be protected from vehicular traffic (install bollard) CPC 507.13.1
☐	Water heater located at wood floor or attic shall be protected with watertight pan with ¾" drain to approved location. (i.e. attic, floor-ceiling, platform) CPC 507.5
☐	Water heater installed in a closet located in a bedroom or bathroom shall have a listed, gasketed door assembly and a listed self-closing device with no hold open mechanism. The door assembly shall be installed with a threshold and bottom door seal. All combustion air shall be obtained from the outdoors. CPC 504.1 & 504.1.1 & 504.1.2 Attic water heater (same access, lighting & receptacle as attic furnace) CPC 508.4 & 508.4.1 & 508.4.2 & 508.4.3 & 508.4.4
☐	Temperature and pressure relief valve (TPRV) shall terminate to the outside or other approved location with ¾" discharge pipe pointing down, terminating a min. 6" and max. 24" above grade. Pressure relief valve piping to be hard drawn copper or galvanized steel or CPVC. PVC shall not be used, and drain is (not allowed to drain into water heater pan). CPC 504.4 & 504.5 & 504.6 & 608.5 (3)
TANKLESS WATER HEATER (Additional requirements) Refer To Manufacture Listing Instructions & CPC 501.0	
☐	Tankless water heater shall be installed per manufacturer's installation instructions. Requires ¾" dedicated gas line (no other appliances on branch) (Manual shall be available for inspector during inspection). Gas calculations required.
☐	NOTE: waive calculations if a 3/4'" dedicated line is connected (split) at the main by up-sizing the meter tee. (up-seized tee example: install 1"x3/4"x3/4" tee for existing 3/4" building service) OAK
☐	Tankless water heater shall be independently vented with a category III (Stainless steel) venting system. Verify clearances to combustibles.
☐	Tankless water heater installed outside shall be listed for outside/exterior location.
FURNACE GENERAL REQUIREMENTS	
☐	Manufacturer's installation and operating instructions: The appliance installer shall leave the manufacturer's installation and operating instructions attached to the appliance. CMC 301.3

☐	HERS Certification for Ducts (if Required)
☐	Required clearances from combustibles. CMC 904.2.1 through 904.2.9
☐	Condensate sediment trap/drip leg shall be installed in such locations so that it will be readily accessible to permit cleaning or emptying. The sediment trap shall be either a tee fitting with a capped nipple in the bottom outlet or other device recognized as an effective sediment trap. CPC 1210.6 & 1210.6.2 & 1212.9
☐	Combustion air: See "Water heater & Furnace" under illustrations in the index for approved methods of obtaining combustion air. Direct vent appliances are exempt from the provisions of CMC 701.1 Exception (1)CMC and shall be installed per the appliance listing. CMC 701.1.1
☐	Gas shutoff valve: Shall be in an accessible location and within 6' from the furnace. Connected to rigid piping upstream from the flexible connection in the same room as the furnace. CPC 1212.6
☐	Disconnect shall be adjacent to and within sight of furnace. CMC 303.8.5 (1)
☐	Dedicated circuit shall be provided for furnace CEC 422.12
☐	Access: Furnace shall be accessible for inspection, service, repair, and replacement without removing permanent construction. CMC 304.1
☐	Anchorage: Furnace shall be securely fastened in place to sustain vertical and horizontal loads. CMC 303.4
FURNACE IN BEDROOM OR BATHROOM CLOSET CMC 904.1(1) (2)	
☐	Closet shall be equipped with a listed, gasketed door assembly. CMC 904.1.2
☐	Listed self closing device. (HOLD-OPEN FEATURE IS NOT ALLOWED)CMC 904.1.1
☐	The door assembly shall be installed with a threshold and bottom door seal. CMC 904.1
☐	All combustion air shall be obtained from the outdoors. CMC 904.1
☐	The closet shall be used for exclusive use of the furnace (NOT FOR STORAGE)CMC 904.1
☐	Exception: Furnace that are direct vent type.
FURNACE IN ATTIC	
☐	Attic access min. 22"x30"net clear opening. (appliance must fit through opening). CMC 304.4
☐	Electrical wiring shall be protected within 6' of attic access scuttle opening. CEC 320.23 (A)
☐	Passageway Min. 24" wide, unobstructed, solid flooring. CMC 304.4.2
☐	Max. 20' from access to appliance if passageway is less than 6' high. CMC 304.4.1
☐	Min. 30"x30" level working platform at front or service side of unit. CMC 304.4.3
☐	Light and receptacle outlet required. CMC 304.4.4 light switch shall be located at attic entry and receptacle outlet within 25' of furnace.
☐	Properly support and secure unit. CMC 303.4
FURNACE UNDERFLOOR	
☐	Crawl space access opening in foundation min. 18"x24",or sized to provide removal of the largest piece of equipment to be removed from the opening. CMC 906.8
☐	Suspend from floor a Min. 6" above ground OR support on slab a min. of 3" above grade. CMC 904.3.1.1 & 904.3.1.2
☐	Min. 12" side clearance, and min. 18" clearance on control side of unit. CMC 906.7
☐	Where excavation exceeds 12" in depth or water seepage is likely to collect, a water tight copper pan or concrete pit 4" above grade is required, unless adequate drainage is provided. CMC 906.9
☐	Secure unit in place. CMC 303.4
☐	Light and receptacle outlet required near appliance. CMC 304.4.4
FURNACE IN GARAGE	
☐	Ignition min. 18" above floor. CMC 305.1

☐	Protection from moving vehicles. (install bollard(s) CMC 305.1.1
☐	Gas burning appliance venting shall comply with CMC CMC 801.1See “Gas Appliance Venting” under illustrations in index.
☐	High efficiency gas appliance: Vent termination per manufacture instructions.
A/C COMPRESSOR	
☐	A/C compressors shall be indicated and located per approved site plan.
☐	Disconnect shall be readily accessible and not more than 6’-7” above grade. (do not install disconnect behind unit.) CEC 440-14 & 240.24 (A)
☐	Identification of equipment: For more than one unit permanent identification on A/C unit disconnect. CMC 303.6
☐	Secure A/C unit to platform. CMC 303.4
☐	Verify that circuit breaker &/or fuse are sized per name plate. ??
☐	Verify that an accessible electrical receptacle is installed at the same level and within 25’ of the A/C unit. The outlet shall not be connected to the load side of the A/C disconnect. CEC 210.63
☐	Not within 5’ from any property line. Verify approved location by zoning.
BASEMENT	
☐	Habitable basements shall have a min. of one exterior emergency escape and rescue opening. R310.1
☐	Egress opening shall not be less than 5.7 sq. ft. with a min. net height of 24” and net width of 20” and not more than 44” from floor to the bottom of clear opening (ladder req’d. if window well over 44” below grade. R 310.2.1 & R310.2.2
☐	Window well egress: Window wells shall have a min. horizontal area of 9 sq. ft. with a min. dimension of 36”. Window well with a vertical depth of more than 44” shall be equipped with an approved permanently affixed steps OR ladder that does not project more than 6” into a 36” egress area, Verify proper guardrails, ladders and drainage. R310.2.3 & Exception, R310.2.3.1
☐	Electrical outlets in unfinished basements require GFCI protection. CEC 210.8 (A) (5)
EJECTOR PUMP	
☐	Approval for installation required on plan. OAK
☐	Each ejector or pump shall have a minimum 2” accessible approved swing check or backwater valve and full way Gate or ball valve. CPC 710.3 (2)
☐	Sump tank shall have a bolt-and-gasketed cover. CPC710.10
☐	Ejector vent shall be run separately through roof, vent size per table 7-3 but never smaller than 1-1/2”. CPC 710.10
☐	Ejector pump and valves shall be accessible for maintenance and replacement. Provide electrical outlet and lighting at or near the pump. CPC 710.0
☐	Receptacle outlet shall not be located in pit. Install receptacle min. 12” above floor level.

FINAL CHECKLIST FOR CERTIFICATE OF OCCUPANCY

The Final CO Checklist only applies to projects that are resulting in a new unit or where a change of occupancy of the building has taken place. It does not apply to remodel, alterations, additions, or repairs. For projects resulting in a new unit or a change of occupancy, the inspector shall provide the Checklist at the earliest possible site visit to ensure that all requirements and paperwork are communicated to the permittee.

REQUIREMENTS FOR FINAL INSPECTION AND CO- CHECKLIST							
The following items are required prior to the FINAL of a building permit. This form must be also completed before starting the process for the issuance of a Certificate of Occupancy.							
Project						Parcel Number	
Required		Building				Grading	
Check if Final in AA. All required permits must be final		Planning				PZ Infrastructure	
		Electrical				PZB	
		Solar				PZE	
		Solar R/B				PZP	
		Plumbing				PX Infrastructure	
		Solar WH				Encroachment	
		Mechanical				CGS	
		Demo				SL	
AMMR Status – Approved or Withdrawn is OK- Other results require		AMMR					
		AMMR 2					
		AMMR 3					
Note	*Solar permits are required only when related to the electrical or plumbing permits.*						
REQUIRE	RECEIVE	TYPICAL REQUIRED DOCUMENTS:					
		Floor Plan (11X17 all floors)					
		Plot Plan for multiple buildings in one lot					
		Special Inspection final reports (wet stamped)					
		Structural Observation letter					
		Formwork Certification form					
		Height Certification					
		Survey Letter					
		PSL Certificate (enter information in AA) App Spec Info.					
		Green Point Rated Documents					
		HERS Certification					
		Commissioning Documents (for newly constructed non-residential buildings with conditioned floor area 10,000 square feet or greater or Mixed-use with commercial portion					
		Construction Debris and Recycling Summary (CDSR/GREEN HALO)					
REQUIRED	RECEIVED	OTHER REQUIRED DOCUMENTS (Project Specific):					

Number of Parking Spaces			

DO NOT FINAL A BUILDING PERMIT IF ANY REQUIRED DOCUMENT IS MISSING		
When document package is verified complete, proceed as follows;		
	1	Final Permit during field inspection
	2	Schedule an Inspection to Final the permit in office after all documents are received
	3	After the building permit final, note in AA comments the “CO draft to Document Box”
No		A copy of this completed form should be submitted with the CO package.

Inspector			Date Submitted	

Chapter 11 SOLAR AND ENERGY STORAGE SYSTEMS

All solar (PV) and Energy Storage systems (ESS) shall be installed as per approved plans and manufacturer specifications. Energy Storage Systems exceeding a combined 13.5KwH shall be approved by the City of Oakland Fire Prevention Bureau. For example, installing two Tesla Powerwalls would trigger compliance with the applicable code sections since they are lithium-ion and are a rated at 13.5 kWh.

PHOTOVOLTAIC SYSTEMS (PV) SOLAR PANELS

SOLAR INSTALLATIONS- CHECKLIST	
Make sure all PV system AC/DC disconnects and circuit breakers are in the open position. Virtual inspection must verify the following:	
All work done in a neat and workmanlike manner (CEC 110.12).	
PV module model number, quantity and location according to the approved plan.	
Array mounting system and structural connections according to the approved plan.	
Roof penetrations flashed/sealed according to the approved plan.	
Array exposed conductors are properly secured, supported and routed to prevent physical damage.	
Conduit installation according to CRC R331.3 and CEC 690.4(F).	
Roof-mounted PV systems have the required fire classification (CBC 1505.9 or CRC R902.4).	
Grounding/bonding of rack and modules according to the manufacturer's installation instructions that are approved and listed.	
Equipment installed, listed and labeled according to the approved plan (e.g., PV modules, DC/DC converters, combiners, inverters, disconnects, load centers and electrical service equipment).	
For grid-connected systems, inverter is marked "utility interactive."	
For ungrounded inverters, installation complies with CEC 690.35 requirements.	
Conductors, cables and conduit types, sizes and markings according to the approved plan.	
Overcurrent devices are the type and size according to the approved plan.	
Disconnects according to the approved plan and properly located as required by the CEC.	

Inverter output circuit breaker is located at opposite end of bus from utility supply at load center and/or service panelboard (not required if the sum of the inverter and utility supply circuit breakers is less than or equal to the panelboard bus rating).	
PV system markings, labels and signs according to the approved plan.	
Connection of the PV system to the grounding electrode system according to the approved plan.	
Access and working space for operation and maintenance of PV equipment such as inverters, disconnecting means and panelboards (not required for PV modules) (CEC 110.26).	

ENERGY STORAGE SYSTEMS

PRE-INSPECTION

 De-energize electrical panels prior to removing the dead-front. Notify tenant/owner/occupant prior to deenergizing. All equipment shall be open and ready for inspection.

 The approved plans, permit, and installation instructions shall be on site at time of inspection.

 Major changes, including revisions, to the installation shall be submitted to the city for review and approval prior to inspection.

 For systems having capacities exceeding the values shown in CFC Table 608.1, see the “Energy Storage Systems (ESS) Submittal Guidelines for Systems Exceeding Values in CFC Table 608.1” inspection checklist.

INSPECTION

ENERGY STORAGE SYSTEMS- CHECKLIST	
Provide the following working clearances: 36” in depth, 30” in width, and 6’-6” in height. Working clearances apply to all electrical equipment. Vegetation, including trees, which impact working clearances, shall be relocated. (CEC 110.26)	
Energy storage systems (ESS) shall be listed and labeled for residential use in accordance with UL 9540. For exceptions, see CRC R327.2. (CRC R327.2)	
Systems connected to the utility grid shall use inverters listed for utility interaction (i.e., UL 1741, or provided as part of the UL 9540 listing). (CRC R327.4, CFC 608.4.5)	
ESS shall be installed in accordance with the manufacturer’s installation instructions and their listings, if applicable, and shall not be installed within a habitable space of a dwelling. (CRC R327.3) A space in a building for living, sleeping, eating or cooking is considered habitable. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces. (CRC R202)	
All ESS equipment shall be listed by a Nationally Recognized Testing Laboratory (NRTL) either individually or as a complete, self-contained system according to a recognized standard. Provide supporting documentation that verifies certification of the equipment.	
Supports: EMT, IMC, and RMC shall be securely fastened in place at least every 10’ and within 3’ of each outlet box, junction box, device box, cabinet, conduit body or other termination. (CEC 342.30 (A), CEC 344.30 (A), CEC 358.30 (A))	
All connections shall be secure.	
All metallic raceways and equipment shall be bonded and electrically continuous.	
Unused opening shall be closed with protection equivalent to the wall of the enclosure. (CEC 408.7)	
The inspector shall check the existing electrical panel for hot spots or unsafe conditions. If existing panel is found to be unsafe, it may be necessary for the property owner to hire a licensed electrician to make repairs or replace equipment. Repairs/replacement shall happen prior to final approval.	
If equipment is subject to physical damage (e.g., motor vehicles, forklifts, etc.), it shall be protected by its construction, approved barriers, or other approved methods. Where protected by its construction, provide supporting documents from the manufacturer. (CEC 110.27, CRC R327.6)	
The selected wiring methods are appropriate for the location and installed in accordance with their intended use. (CEC Chapter 3)	

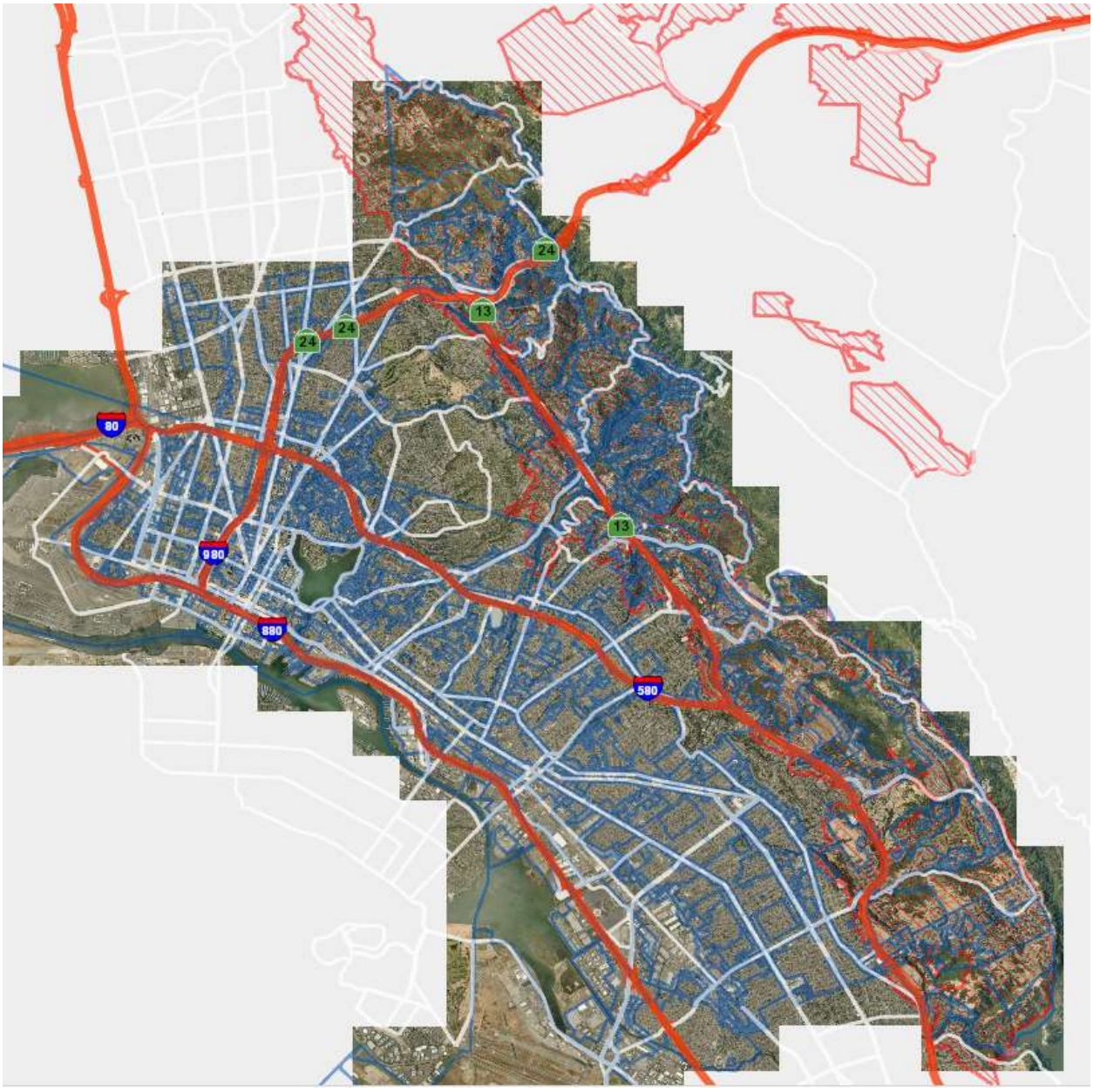
Denote whether energy storage system is ac-coupled or dc-coupled. Where installed with a photovoltaic (PV) system, if the system is dc-coupled, show that the rapid shutdown functionality for controlled conductors of a roof-mounted PV system remains unaffected by dc-coupled energy storage circuit(s). Overcurrent protection devices (e.g., breakers) shall be installed so that the center of the operating handle, at its highest position, is not more than 6'-7" above the floor or working platform; it shall also be located in a readily accessible location. This applies to new and existing equipment installations. (CEC 404.8(A)(1))	
STRUCTURAL ATTACHMENT	
Verify that the attachment of the battery storage unit to the wall or floor is per the approved plans and manufacturer specifications. If the wall or floor construction differs from the approved plans, a revision is required prior to re-inspection.	
If special inspection is required for the attachment/anchorage, the report from the special inspector shall be on site at time of inspection.	
AC DISCONNECT	
Verify that the utility ac disconnect is located within sight and within 10' of main electrical service. The ac disconnect shall be readily accessible with visible-blades and lockable.	
The equipment grounding lug shall be as specified by the manufacturer. Verify that the lug matches the part number as specified on the inside of the door. Verify that the grounding lugs are located where specified by manufacturer. (CEC 110.3 (B))	
Where a PV system is installed, each system shall have its own ac disconnect. The two ac disconnects shall not be combined into a single ac disconnect. (CEC 690.17, NEC 706.7(A))	
Remove any insulating finish, such as paint, under the equipment grounding lug prior to installation. (CEC 250.12)	
Maximum height requirements for disconnects applies to integrated disconnect (e.g., Tesla PowerWalls or similar applications). (CEC 404.8(A)(1))	
MAIN ELECTRICAL SERVICE	
Circuit breakers shall be of the same manufacturer as the main service panel. (CEC 110.3 (B))	
Plug-in type back-fed circuit breakers connected to an interconnected supply shall be secured in place. (CEC 408.36(D))	
If there is no existing ac grounding electrode, the ESS contractor shall install (2) ground rods at the main electrical service. If there is only (1) ground rod, a second one shall be installed. Ground rods shall be a minimum of 6' apart. (CEC 250.52(5), CEC 250.53(A)(3))	
SIGNS AND LABELS	
Labels shall be phenolic where exposed to sunlight. Labels required on conduit shall be permanent, weather resistant, and suitable for the environment. Labels shall be red background with white lettering. The following labels must be provided:	

CEC Article	Location of Label	Verbiage
702.7 705.10 706.11 (NEC 2017) PAFD	A sign indicating the type and location of all power sources on or in the building is placed at the main service panel.	A PLAQUE SHALL BE INSTALLED IN ACCORDANCE WITH 705.10 (Oriented in the correct direction and the label of the ESS shall match that installed in the ESS)
480.6	DC Battery Disconnecting Means	Nominal Battery Voltage_____ Nominal available short-circuit current derived from the stationary battery system_____ Date of calculation_____
CPA Policy	Subpanels	"NO BRANCH CIRCUIT LOADS LARGER THAN XX AMPS TO BE INSTALLED IN THIS SUBPANEL." (The "XX" values provided are based on the ESS manufacturer's installation instructions.)
PAFD	ESS	ENERGY STORAGE SYSTEM CONTAINS ENERGIZED BATTERIES
CPA Policy/CPA Utilities	AC Disconnect	ENERGY STORAGE SYSTEM AC DISCONNECT

Chapter 12 Wildland-Urban Interface (WUI)

Properties located in certain areas of the City of Oakland, primarily in the Oakland Hills are subject to the requirements of the Wildland-Urban Interface contained in Chapter 7A and CRC Section R337.

[Planning and Zoning Map (arcgis.com)]



Where do these requirements apply? Wildland Urban Interface (WUI) Construction requirements, Chapter 7A, apply to new buildings in all State Responsibility Areas (SRA) and in Very High Fire Hazard zones within Local Responsibility Areas (LRA).

How do I know if I am in one of these areas? Mainly the Oakland Hills are subject to the Wildland Urban Interface requirements.

Does my addition or remodel need to comply? If the original structure was built under these regulations, then yes. If your original building were constructed under a Building Permit issued in 2007 or earlier, an addition or remodel to it would not have to comply. Any addition or remodel to a structure built under a 2008 Building Permit must comply.

Where can I find listed products that comply with these requirements? From the manufacturer or products that are listed though the Office of the State Fire Marshall (SFM), available online at: http://www.fire.ca.gov/wildland.php

Can I use quarter-inch mesh on vents? All attic and under floor ventilation, other than eave and soffit vents, may use quarter-inch wire.

Can I use eave vents and soffit vents in Fire Hazard Severity Zones? Only if they are tested and listed to resist the intrusion of flame and burning embers into the attic.

What do I need to show on my plans? *See each of the following:*

Roof Coverings: Specify the type and rating of the roof covering. Class A or noncombustible roofing is required (aluminum is not considered non-combustible). Specify the roof material and provide the listing for other than composition, steel or tile.

Roof Vents: Eave or soffit vents are not permitted unless listed by an approved agency. All other roof vents can be % inch corrosion resistant mesh. For vents in the eave or soffit, provide the listing and detail the size, number and location of vents to meet the attic ventilation requirements of 1/150 of the area to be ventilated divided between upper and lower vents. The listed vents will have reduced venting capability that must be accounted for OR remove all details and references to eave or soffit vents and detail the number, size and location of vents to meet the roof ventilation requirements of CBC that requires the net vent area to be 1/150 of the area to be ventilated divided between upper and lower vents. *Since eave and soffit vents are prohibited, unless listed, the lower vents must be located as low as possible on the roof surface and/or low on the gable ends to provide the required lower ventilation.*

Gutters: Add a note that if gutters are installed, they will be provided with a means to prevent the accumulation of debris in the gutter, such as screening.

Eaves, soffits and similar overhangs: Amend and detail on the plan showing the underside is protected by materials that are non-combustible OR ignition resistant (provide listing) or listed under SFM 12-7A-3.

Exterior walls: Amend and detail the plans to show the exterior walls are approved

noncombustible OR ignition resistant OR heavy timber OR log walls OR listed under SFM 12-7A-1. Currently fiber cement siding, traditional 3-coat stucco and full log walls are acceptable without listings. Other materials will require the submittal of the listing.

Exterior Windows, glazing in doors: Detail/specify on the plans that all (including garage) glazing is insulated glass with a minimum of one-tempered pane of glass OR glass block OR is 20-minute rated OR listed under SFM 12-7A-2. Specify each window on the plans as tempered or the listing.

Exterior Doors: Specify all exterior doors to be noncombustible OR listed under SFM 12-7A-1 OR a rated 20-minute door OR solid core 1-3/8 inch thick with interior field panel thickness no less than 1-114 inches.

Garage Doors: Specify Garage Doors as either noncombustible OR exterior fire-treated wood.

Decks: (deck surfaces, stair treads/risers, porches, and balconies): Specify heavy timber (minimum
3" nominal thickness) OR exterior fire-treated wood OR non-combustible materials OR ignition resistant meeting SFM 12-7-A, parts A and B OR material that passes the SFM 12- 7-A (Part A only) and the walls the deck is attached to can only be non-combustible or ignition resistant material unless the material has a flame spread rating of "B" or better than any approved wall material is allowed. *These regulations do not apply to the underlying deck support material but note that all deck support material must be pressure treated or naturally resistant to decay.*

Underside of cantilevered/overhanging appendages and floor projections (Not decks): Show how the underside maintains the ignition resistances of the exterior walls or enclosed to grade.