

# CITY OF MILPITAS

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## STRUCTURAL PLAN REVIEW CHECKLIST

### SINGLE FAMILY RESIDENTIAL (Groups R-3, R-3.1 and U)

The intent of this checklist is to provide a general guideline for the structural plan review. This checklist may not include items related to all possible projects. This checklist may include more items than specific set of structural plans may encompass.

Referenced Codes:

- 2013 California Building Code (CBC)
- 2014 Milpitas Municipal Code (MMC)
- ASCE 7-10

\* Code section referenced is CBC unless noted otherwise.

|  | Code Requirements   | Code section             | Req'd |
|--|---|--------------------------|-------|
| <b>A. GENERAL</b>                            |   |                          |       |
| <b>Conventional Light-Frame Construction</b> |   |                          |       |
| 1.   | Buildings are permitted to be constructed in accordance with the provisions of conventional light-frame construction subject to the following limitations: <ul style="list-style-type: none"> <li>a. Building shall be limited to a maximum of one story above grade.</li> <li>b. Bearing wall height shall not exceed a stud height of 10 feet. Maximum floor to floor height shall not exceed 11 feet 7".</li> <li>c. Average dead loads shall not exceed 15 psf for combined weight of roof &amp; ceiling, exterior walls, floors &amp; partitions.</li> <li>d. Roof trusses and rafters shall not span more than 40 feet between points of vertical supports.</li> <li>e Wind speed <math>V_{sad}</math> shall not exceed 100 mph as determined in accordance with section 1609.3.1.</li> </ul>   | 2308.2<br>2308.12.1      |       |
| <b>Structurally Designed Building</b>        |   |                          |       |
| 2.   | The design loads and other information pertinent to the structural design required by section 1603.1.1 through 1603.1.9 shall be indicated on the construction documents. As a minimum they shall include: <ul style="list-style-type: none"> <li>a. ROOF : _____ PSF DEAD LOAD      _____ PSF LIVE LOAD<br/>                         FLOOR : _____ PSF DEAD LOAD      _____ PSF LIVE LOAD</li> <li>b. WIND PER sec. 1609      _____ MPH BASIC WIND<br/>                         SPEED (<math>V_{asd}</math>),<br/>                         EXPOSURE CATEGORY      _____</li> <li>c. SEISMIC PER sec. 1613<br/>                         <math>S_s</math> : _____      S1      _____<br/>                         SITE CLASS      _____<br/>                         <math>S_{ds}</math> : _____      Sd1      _____<br/>                         SEISMIC DESIGN CATEGORY      _____<br/>                         R, RESPONSE COEFFICIENT FACTOR      _____</li> </ul> | 1603.1                   |       |
| 3.   | Unless the plans are prepared using the requirements of conventional light-frame construction, structural plans must be designed by an Engineer or Architect licensed by the State of California and the final set of plans prepared for permit issuance shall be stamped and signed by the design Engineer or Architect.   | 2308                     |       |
| 4.   | Projects for all structures located in the hillside areas must be prepared and designed by Civil/ Structural Engineer or Architect licensed in the State of California.   | City Policy<br>BDP-BLG09 |       |

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| Code Requirements              |   | Code section   | Req'd |
|--------------------------------|---|----------------|-------|
| 5.                             | All structures and their elements located in the hillside area shall be designed for a minimum wind speed (Vasd) of 95 mph and exposure C.  | MMC II-3-2.09  |       |
| 6.                             | All structures located in the hillside shall conform to minimum requirements of CBC section 2308.10.1.  | MMC II-3-2.09  |       |
| 7.                             | The live load in attic where the maximum clear height between joist and rafter is 42" or more or there are two or more adjacent trusses capable of containing a rectangle 42" high by 2' wide shall be 20 psf.  | Table 1607.1   |       |
| <b>B. CONVENTIONAL FRAMING</b> |   |                |       |
| 8.                             | Indicate sizes and locations of all structural members on plans. Framing details shall be referenced on plans.  |                |       |
| 9.                             | Sizes, spacing and span for floor joists shall be in accordance with Table 2308.8(1) or (2).  |                |       |
| 10.                            | Floor girders for single story construction or girders supporting loads from a single floor shall not be less than 4X6 for spans 6' or less provided that girders are spaced not more than 8' on center.  | 2308.7         |       |
| 11.                            | Where a girder is spliced over a support, an adequate tie shall be provided. Not less than 3" of bearing shall be provided when a girder is supported on masonry or concrete.   | 2308.7         |       |
| 12.                            | The ends of joist shall not have less than 1.5" of bearing on wood or metal, or less than 3" on masonry.  | 2308.8.1       |       |
| 13.                            | Joists shall be supported laterally at the ends and at each support by solid blocking of not less than 2" thick and full depth of the joist.  | 2308.8.2       |       |
| 14.                            | Joist framing from opposite sides of a beam, girder or partition shall be lapped at least 3".   | 2308.8.2       |       |
| 15.                            | Where the nominal depth to thickness ratio of the framing member exceeds 6 to 1, there shall be one line of bridging for each 8' of span.   | 2308.8.5       |       |
| 16.                            | The sizes, height and spacing of studs shall be in accordance with Table 2308.9.1.  | Table 2308.9.1 |       |
| 17.                            | Not less than three studs shall be installed at each corner of an exterior wall.  | 2308.9.2       |       |
| 18.                            | Ends of double top plates of bearing and exterior wall studs shall be offset at least 48" and shall be nailed with not less than eight 16d face nails on each side of the joint.  | 2308.9.2.1     |       |
| 19.                            | Header and its support shall be provided per Table 2308.9.5 over each opening in exterior bearing walls for one and two family dwelling with minimum header bearing of 1.5" X full width of the header. Table 2308.9.6 may be used for headers over each opening in interior bearing partition.   | 2308.9.5.1 & 2 |       |
| 20.                            | Where plumbing, heating or other pipes are placed in or partly in a partition, necessitating the cutting of the soles or plates, a metal tie not less than 16 gage and 1.5" wide shall be fastened to each plate across and to each side of the opening with not less than 6-16d nails.   | 2308.9.8       |       |
| 21.                            | In exterior walls and bearing partitions, any wood stud is permitted to be cut or notched to a depth not exceeding 25% of its width.  | 2308.9.10      |       |
| 22.                            | A hole not greater in diameter than 40% of the stud width is permitted to be bored in any wood stud, 60% of the stud width is permitted, if each bored stud is doubled and not more than 2 such successive doubled studs are so bored. The edge of the bored hole shall not be nearer than 5/8" to the edge of the stud. Bored hole shall not be located at the same section of stud as a cut or notch. | 2308.9.11      |       |
| 23.                            | Conventional framing details required in section 2308.10 for roof and ceiling framing apply to roofs having a minimum slope of 3 units vertical in 12 units horizontal or greater, otherwise ridge board, hips and valleys shall be designed as beams.  | 2308.10        |       |
| 24.                            | Rafters shall be framed directly opposite each other at the ridge. There shall be a ridge board at least 1" nominal thickness at ridges and not less in depth than the cut end of the rafter.   | 2308.10.4      |       |

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| Code Requirements          |   | Code section                     | Req'd |
|----------------------------|---|----------------------------------|-------|
| 25.                        | Ceiling joists and rafters shall be nailed to each other and the assembly shall be nailed to the top wall plate per Table 2304.9.1 and 2308.10.1. Ceiling joists shall be continuous or securely joined where they meet over interior partitions and fastened to adjacent rafters in accordance with Tables 2308.10.4.1 & 2304.9.1. Where ceiling joists are not parallel to rafters, an equivalent rafter tie shall be installed in a manner to provide a continuous tie across the building as per section 2308.10.4.1.   | 2308.10.4.<br>1                  |       |
| 26.                        | Notching at the ends of rafters or ceiling joists shall not exceed one-fourth the depth. Notches in the top or bottom of the rafter or ceiling joist shall not exceed one-sixth the depth and shall not be located in the middle one-third of the span. Bored hole diameter in rafters or ceiling joists shall not exceed one-third the depth of the member and not be within 2" of top and bottom.   | 2308.10.4<br>.2                  |       |
| 27.                        | Purlin installed to reduce the span of rafters shall not be smaller than the supported rafter and shall be supported by struts to bearing walls. The maximum span of 2X4 and 2X6 purlin is 4' and 6' respectively. Struts shall not be smaller than 2X4 with maximum unbraced length of 8' and the minimum slope shall not be less than 45 degrees from the horizontal.   | 2308.10.5                        |       |
| <b>C. LATERAL SYSTEM</b>   |   |                                  |       |
| <b>Conventional Design</b> |   |                                  |       |
| 28.                        | Indicate type of shear walls and their minimum length on plans to match the design calculations or per the requirements of brace wall in the conventional light-frame construction.   |                                  |       |
| 29.                        | Indicate the type/size and locations of hold-downs on the plans.  |                                  |       |
| 30.                        | Conventional light-frame construction braced wall panels shall be distributed along the length of the braced wall line and start at not more than 8' from each end of the braced wall line.   | 2308.12.4                        |       |
| 31.                        | The sum of lengths of braced wall panels at each braced wall line shall conform to the required percentage of wall length per Table 2308.12.4.  | 2308.12.4                        |       |
| 32.                        | In conventional light-frame construction, when the wood structural panel bracing of the same material is on two faces of the wall, the minimum length is permitted to be one-half the tabulated value in Table 2308.12.4 but height to width ratio shall not exceed 2:1 and design for uplift is required.  | Footnote a<br>Table<br>2308.12.4 |       |
| 33.                        | In conventional light-frame construction, the minimum length of panel bracing shall have the height to width of brace wall not to exceed 2 to 1.  | Table<br>2308.12.4               |       |
| 34.                        | The braced wall line spacing between interior and exterior braced wall lines shall not exceed 25' in conventional light-frame construction.   | 2308.12.3                        |       |
| 35.                        | Braced wall lines shall be supported by continuous foundations with the following exceptions:<br><ul style="list-style-type: none"> <li>a. One-story buildings with maximum plan dimension not exceeding 50' may have continuous foundations located at exterior braced wall lines only.</li> <li>b. Two-story buildings with a maximum plan dimensions not exceeding 50' may have braced wall lines supported on continuous foundations at the exterior wall only, provided cripple walls do not exceed 4' in height and where the first story is supported on a raised wood framed floor, the interior braced wall panels are directly supported by either doubled joists, continuous 4X blocking or minimum 4X floor beams.</li> </ul> | MMC II-3-<br>2.34                |       |

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|                          | <b>Code Requirements</b>  | <b>Code section</b>           | <b>Req'd</b> |
|--------------------------|---|-------------------------------|--------------|
| 36.                      | <p>Shear walls sheathed with Portland cement plaster, gypsum lath, gypsum sheathing or gypsum board shall not be used to resist seismic forces in structures assigned to Seismic Design Category D, E or F.</p> <p><b>Exception:</b> Expanded metal or woven wire lath and Portland cement plaster on studs spaced at 16 inches (406 mm) on center installed per Table 2306.3(3) is permitted for use in one story structures of R-3 and U occupancies in Seismic Design Category D.</p>  | MMC II-3-2.33                 |              |
| 37.                      | <p>Portions of structures with one or more conditions described in items 1 through 6 in sec. 2308.12.6 shall be considered irregular and conventional light-framed construction shall not be used. Such irregular portion of structures shall be designed to resist the forces specified in Chapter 16 to the extent such irregular features affect the performance of the conventional framing system.</p>   | 2308.12.6                     |              |
| <b>Engineered Design</b> |   |                               |              |
| 38.                      | <p>The basic lateral and vertical seismic force-resisting system shall conform to one of the types indicated in Table 12.2-1 of the ASCE 7-10. The structural system used shall be in accordance with the seismic design category and height limitations indicated in ASCE 7-10 Table 12.2-1. The appropriate response modification coefficient, R, system overstrength factor, omega, and deflection amplification factor, Cd, indicated in ASCE 7-10 Table 12.2-1 shall be used in determining the base shear, element design forces and design story drift.</p>  |                               |              |
| 39.                      | <p>When the soil properties are not known in sufficient detail to determine the site class, site class D shall be used.</p>   | 1613.3.2,<br>ASCE 7<br>11.4.2 |              |
| 40.                      | <p>When using alternative basic load combinations in allowable stress design that includes wind or seismic loads, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards.</p>   | 1605.3.2                      |              |
| 41.                      | <p>Where different seismic force-resisting systems are used in combination to resist seismic forces in the same direction the most stringent applicable structural system limitations contained in ASCE 7 Table 12.2-1 shall apply.</p>   | ASCE 7<br>12.2.3              |              |
| 42.                      | <p>Where the lower system has a lower response modification coefficient, R, the design coefficients (R, Omega and Cd) for the upper system are permitted to be used to calculate the forces and drifts of the upper system. Forces transferred from the upper system to the lower system shall be increased by multiplying by the ratio of the higher response modification coefficient to the lower response modification coefficient. Where the upper system has a lower response modification coefficient, the design coefficients (R, Omega and Cd) for the upper system shall be used for both systems except for detached one &amp; two family dwellings of light frame construction.</p> | ASCE 7<br>12.2.3.1            |              |
| 43.                      | <p>Single-story steel ordinary moment frames and intermediate moment frames in structures assigned to seismic design category D or E are permitted up to a height of 65' where the dead load supported by and tributary to the roof does not exceed 20 psf. Dead loads tributary to the moment frame, of the exterior wall more than 35' above the base shall not exceed 20 psf.</p>  | ASCE 7<br>12.2.5.6            |              |
| 44.                      | <p>Other steel ordinary moment frames in structures assigned to seismic design category D or E not meeting the limitations set forth in section 12.2.5.6 are permitted within light-frame construction up to a height of 35' where neither the roof nor the floor dead load supported by and tributary to the moment frames exceeds 35 psf, the dead load of the exterior walls tributary to the moment frame shall not exceed 20 psf.</p>  | ASCE 7<br>12.2.5.7            |              |

## STRUCTURAL PLAN REVIEW CHECKLIST SINGLE FAMILY RESIDENTIAL (Cont'd)

| Code Requirements    |  | Code section         | Req'd |
|----------------------|--|----------------------|-------|
| 45.                  | Redundancy factor for structures assigned to seismic design category D through F shall be equal to 1.3 unless one of the two conditions in sec.12.3.4.2 of ASCE 7 is met, whereby the redundancy factor is permitted to be taken as 1.0.   |                      |       |
| 46.                  | Columns, beams, trusses, or slabs supporting discontinuous walls or frames of structures having horizontal irregularity type 4 of ASCE 7 Table 12.3-1 or vertical irregularity type 4 of ASCE 7 Table 12.3-2 shall have the design strength to resist the maximum axial force that can develop in accordance with the load combinations with overstrength factor of section 12.4.3.2 of ASCE 7.  | ASCE 7<br>12.3.3.3   |       |
| 47.                  | Where allowable stress design is used for load combinations with overstrength, allowable stresses are permitted to be determined using allowable stress increase of 1.2 per ASCE 7 sec. 12.4.3.3. This increase shall not be combined with increases in allowable stresses or load combination reductions otherwise permitted by the ASCE standard or the material reference document except that combination with the duration of load increases permitted in NDS is permitted. | ASCE 7<br>12.4.3.3   |       |
| 48.                  | In structures assigned to seismic design category C, D, E or F, collector elements, splices, and their connections to resisting elements shall resist the load combinations with overstrength factor of ASCE 7 sec. 12.4.3.2, except in structures or portions thereof braced entirely by light-frame shear walls.   | ASCE 7<br>12.10.2.1  |       |
| 49.                  | Any smaller portion of the structure shall be tied to the remainder of the structure with elements having a design strength capable of transmitting a seismic force of 0.133 times Sds, times the weight of the smaller portion or 5 percent of the portion's weight, whichever is greater.  | ASCE 7<br>12.1.3     |       |
| 50.                  | In structures assigned to seismic design category D, E & F, horizontal cantilever structural shall be designed for a minimum net upward force of 0.2 times the dead load in addition to applicable load combinations of ASCE 7 sec. 12.4.  | ASCE 7<br>12.4.4     |       |
| 51.                  | Periodic special inspection is required for nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system, including wood shear walls, wood diaphragm, drag struts, braces, shear panels and hold-downs, except where the fastener spacing of the sheathing is more than 4" on center.   | 1705.11.2            |       |
| 52.                  | The height, h, and the width, w, ratio of wood structural panels shall not exceed 2 to 1. For design to resist seismic forces, shear wall height-width ratio greater than 2 to 1, but not exceeding 3.5 to 1 are permitted provided the allowable shear values in Table 2306.4.1 are multiplied by 2w/h.   | SDPWS<br>Table 4.3.4 |       |
| <b>D. FOUNDATION</b> |  |                      |       |
| 53.                  | All new foundations required due to building additions to existing occupancies shall be the same type of foundation system as the existing structure.  | MMC<br>II-3-2.13     |       |
| 54.                  | A soil report is required for both new residences and additions to residences in hillside areas.   | MMC<br>II-3-2.13     |       |
| 55.                  | Concrete in footings shall have a specified compressive strength f'c of not less than 2,500 psi at 28 days.  | 1808.8               |       |
| 56.                  | The assumed frictional resistance developed by any pier or uncased case-in-place piles shall not exceed one-sixth of the bearing value of the soil material at minimum depth set forth in Table 1806.2, up to maximum of 500 psf.  | 1810.3.3.<br>1.4     |       |
| 57.                  | Addition to R-3 occupancies without an available soils report and where the existing foundation system is a standard "T" type or a pier and grade beam type, may be constructed per MMC II-3-2.13 and in accordance with Table 1806.2 & 1809.7 at the option of the property owner.  | MMC<br>II-3-2.13     |       |
| 58.                  | Special inspection shall not be required for isolated spread footing of buildings three stories or less in height that are fully supported on earth or rock, where the structural design of the footing is based on a specified compressive strength f'c no greater than 2,500 psi.  | MMC<br>II-3-2.12.    |       |

**STRUCTURAL PLAN REVIEW CHECKLIST  
SINGLE FAMILY RESIDENTIAL (Cont'd)**

| Code Requirements |  | Code section  | Req'd |
|-------------------|--|---------------|-------|
| 59.               | Special inspection shall not be required for continuous concrete footing supporting walls of buildings three stories or less in height that are fully supported on earth or rock, where the footing supports walls of light-frame construction and is designed in accordance with Table 1809.7 and based on specified compressive strength $f'_c$ no greater than 2,500 psi, regardless of the compressive strength specified in the construction documents or used in the footing construction. | MMC II-3-2.12 |       |
| 60.               | Sill plate on concrete or masonry slab that is in direct contact with earth shall be of naturally durable or preservative-treated wood.  | 2304.11.2.4   |       |
| 61.               | Wood framing members, including wood sheathing, that rest on exterior foundation walls shall be 8" from exposed earth unless they are of naturally durable or preservative treated wood.   | 2304.11.2.2   |       |
| 62.               | Where wood joists or the bottom of a wood structural floor without joists are closer than 18" or wood girders are closer than 12" to the exposed ground in crawl spaces or unexcavated areas located within the perimeter of the building foundation, the floor assembly (including posts, girders, joists and sub-floor) shall be naturally durable or preservative treated wood..  | 2304.11.2 .1  |       |
| 63.               | Foundation plates or sills shall be bolted or anchored to the foundation with not less than 0.5" diameter steel bolts or approved anchors. Bolts shall be embedded at least 7" into concrete or masonry, and spaced not more than 6' apart. There shall be a minimum of two bolts or anchor straps per piece with one bolt or anchor strap located not more than 12" or less than 4" from each end of each piece.  | 2308.6        |       |
| 64.               | Sill anchorage of braced wall shall conform to section 2308.6 except that such anchors shall be spaced at not more than 4' on center for structures over two stories in height.  | 2308.3.3      |       |
| 65.               | Anchor bolts for shear walls shall include steel plate washers, a minimum 0.229" by 3" square between the sill plate and nut.  | 2308.12.8     |       |
| 66.               | Fasteners for preservative-treated and fire-retardant-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel silicon bronze or copper.  | 2304.9.5. 1   |       |