Broward County Board of Rules and Appeals Meeting Agenda

September 11, 2025 | Time: 7:00 PM

Zoom Meeting Information:
https://broward-org.zoomgov.com/j/1617268759
Meeting ID: 161 726 8759

I. CALL MEETING TO ORDER

II. ROLL CALL

III. APPROVAL OF AGENDA

IV. APPROVAL OF MINUTES – August 14, 2025, Board Meeting

V. PUBLIC COMMENT (Except public hearing items on this agenda)
Public comments are limited to 3 minutes.

VI. CONSENT AGENDA

1. **Certifications** – Staff Recommended

CITY OF COCONUT CREEK
Canfield, Brian, Chief Mechanical Inspector

CITY OF CORAL SPRINGS
Jeoboam, Carpelo, Assistant Building Official

TOWN OF DAVIE
Salas, Gladys, Chief Structural Inspector

CITY OF FORT LAUDERDALE
Travers, John, Building Official

CITY OF HOLLYWOOD
Robinson, Roy, Mechanical Inspector – 120-Day Temporary

CITY OF MARGATE
Young, Marc-Stuart Ameer, Assistant Building Official

CITY OF PEMBROKE PINES
Palma, Emmanuel D., Mechanical Inspector – 120-Day Temporary

CITY OF POMPANO BEACH
Young, Ashlyn, Fire Inspector

COUNTYWIDE
Giunta, John Joseph, Plumbing Plans Examiner
Morgan, Forrest, Plumbing Plans Examiner
Moyal, Henery, Electrical Inspector
Orozco, Jesus A., Structural Inspector
Salas, Gladys, Structural Inspector
Salas, Gladys, Structural Plans Examiner

VII. REGULAR AGENDA

1. **Appeal #25-04 Tewfig Alexander Khoury, Seeks an Appeal of the Town of Davie Building Official's Actions Pertaining to Permit #2024-6024**

    a. Staff Report
    b. Board Questions
    c. Board Action

2. **Fiscal Year 2026 Budget (October 1, 2025 – September 30, 2026)**

    a. Staff Report
    b. Board Questions
    c. Board Action

3. **Proposed Formal Interpretation #36 of FBC Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1 Emergency Repairs**

    a. Staff Report
    b. Board Questions
    c. Board Action

4. **Proposed Formal Interpretation #37 of FBC Residential, 8th Edition, Section M1506.3 Exhaust Openings**

    a. Staff Report
    b. Board Questions
    c. Board Action

5. **Proposed Formal Interpretation #38 of Broward County Amendments to Chapter 3, Subsection 307.2.1 of the 2023 Florida Building Code – Mechanical, 8th Edition**

    a. Staff Report
    b. Board Questions
    c. Board Action

6. **Director's Report**

7. **Attorney's Report**

8. **Committee Reports**

9. **General Board Member Discussion**

10. **Adjournment**

If a person desires to appeal any decision with respect to any matter considered at this meeting, such person will need a record of the proceedings and, for this reason, such person may need to ensure that a verbatim record of the proceeding is made, which includes the testimony and evidence upon which the appeal is to be based (FS Sec.286.0105).

Members: If you cannot attend the meeting, please get in touch with Dr. Barbosa at 954-931-2393 between 6:00 PM and 7:00 PM.

August 14, 2025
Board Meeting Minutes

Broward County Board of Rules and Appeals
Meeting Minutes, August 14, 2025

I. CALL MEETING TO ORDER

Chairman Kamm called a published virtual meeting of the Broward County Board of Rules and Appeals to order at 7:00 PM.

II. ROLL CALL

R. Art Kamm, Chairman	Stephen E. Bailey, Vice Chairman
Eduard Badiu	Gregg D'Attile
Peter Deveaugh	Jeff Falkanger
Sergio Pellecer	Michael Rada
Scott Taggart	David Tringo
Dennis Ulmer	Derek Wassink

Total members present: 12

III. APPROVAL OF AGENDA

Mr. Ulmer made a motion to approve the agenda, and Mr. D'Attile seconded the motion. The motion passed by unanimous vote.

IV. APPROVAL OF MINUTES – July 10, 2025, Board Meeting

Mr. Deveaugh made a motion, and Mr. Badiu seconded it, to approve the July 10, 2025, minutes as submitted. The motion passed by unanimous vote.

V. PUBLIC COMMENT (Except public hearing items on this agenda) - none

Public comments are limited to 3 minutes.

VI. CONSENT AGENDA

1. **Certifications** – Staff Recommended

Mr. Deveaugh made a motion, and Mr. Pellecer seconded the motion to approve the certifications as recommended by staff. The motion passed by a unanimous vote.

VII. REGULAR AGENDA

1. **Second Reading of the Proposed Modification to the Florida Building Code, Broward County Administrative Amendments, 8th (2023) Edition, Section 110.3.13, Virtual Inspections**

   a. Staff Report

      Dr. Ana Barbosa, Administrative Director, noted that this is the second reading and public hearing of the proposed amendment.

   b. Public Hearing – none

DRAFT

c. Board Questions

Mr. Deveaugh asked whether the building official or AHJ has complete discretion to allow or disallow virtual inspections for conventional non-private provider permit applications.

In response to Mr. Deveaugh, Mr. Rolando Soto, Chief Mechanical Code Compliance Officer, advised that Section 553.79 speaks about the rights of the Building Official and his staff. Section 553.79(1) addresses private providers and preempts anyone from allowing the private provider to perform inspections in either physical or virtual form.

Mr. Deveaugh supported posting the voluntary guidelines on the Board's website but opposed codifying them.

Mr. Ulmer felt this amendment was not good from the consumer's perspective.

d. Board Action

Mr. D'Atille made a motion, and Mr. Falkanger seconded the motion to approve the amendment on second and final reading. The motion passed by unanimous vote.

2. <u>Second Reading of the Proposed Modifications to the Broward County Administrative Amendments to Chapter 1 of the Florida Building Code, Section 107.3.4, Related to Requirements for Professional Design</u>

a. Staff Report

Mr. Rolando Soto, Chief Mechanical Code Compliance Officer, noted this is a second reading. The amendment follows and brings the language in Chapter 1 in line with the Florida Statutes.

b. Board Questions

Mr. Deveaugh asked why a long-standing restriction previously required a design professional, such as an architect or engineer, to submit building plans is being removed.

In response, Mr. Charles Kramer, Board Attorney, explained that Florida Statute 481.229 was changed insofar as submission of architectural design plans. However, it did not contemplate structural issues. Any structural, electrical, or mechanical elements with a value over $25,000 must be stamped and sealed by an engineer. Mr. Soto advised that structural work is not included in this amendment. There is a $25,000 limit on architectural design by a non-registered architect for public buildings. Mr. Kramer pointed out that the statute specifically prohibited any preempting. The change before the Board was necessary because of the Florida Statute changes. There is a legal opinion on this issue. Mr. Soto indicated that the statute allows an architect to perform incidental engineering work and vice versa for an engineer. Mr. Kramer noted that the language did not relieve engineers under F.S. 471.

Mr. Kramer and Mr. Soto confirmed Mr. Rada's example of a multi-million-dollar single-family residence and his understanding that an architect's signature and seal are not required. Mr. Rada concluded that the plan review would become more complicated.

DRAFT

c. Public Hearing

Mr. Erik Scheuermann, CPBD, CGC, indicated he is a certified professional building designer (CPBD); however, this designation is not recognized. These individuals are not architects but are well-versed in all construction aspects up to a certain size. Engineering is required in terms of structural. As a CGC, he can design and build, but is still required to have an engineer or an architect sign off on the architecture because CPBD's certificates are not recognized.

Mr. Jack Butler felt other relevant exemptions in addition to licensure as an architect. They are F.S. 471.003(2)(a) for property owners practicing engineering for construction on their own property, (h) contractors performing MEP work below certain thresholds and F.S. 489.113(9)(b)2 that provides exemptions for both architecture and engineering when a certified contractor constructs a single or two-family dwelling or any one-story structure of 1200 square feet or less. He felt a complete list would be helpful.

Mr. Claudio Grande, Building Official, City of Wilton Manors, emphasized that Broward County lies in the High Velocity Hurricane Zone and builds differently than other areas. The destruction that occurs elsewhere in Florida is apparent. The proposed amendment is a disservice to the residents of Broward County. He encouraged the Board to vote this down.

Ms. Chandra Doucette believed the goal is uniformity, and there is a movement toward harsher standards in the Building Code for the entire state. She opposed BORA trying to separate itself from the rest of the state.

d. Board Action

Mr. Deveaugh pointed out that if a design professional does not draw the plans, a burden is being placed on the plans examiner, which is not their function. Also, as the entire state starts to experience high-velocity hurricane winds, those areas should upgrade to Broward County requirements.

Mr. Wassink pointed out that a structural engineer would still be required to sign all drawings.

Mr. Scheuermann pointed out that there is a middle ground to this issue, and that would be certified professional building designers.

Mr. D'Attile made a motion, and Mr. Falkanger seconded the motion to approve the proposed code amendment to Section 107.3.4 as presented on second and final reading. The motion passed by a vote of 7-5, with Mr. Bailey, Mr. Deveaugh, Mr. Rada, Mr. Tringo, and Mr. Ulmer voting no.

3. <u>Contract Renewal for Administrative Director</u>

Dr. Barbosa advised that her current contract ends on August 22, 2025. It would be a three-year extension. The only change has to do with termination without cause.

Mr. D'Attile made a motion, and Mr. Pellecer seconded the motion to approve the three-year contract from August 2025 through August 2028. The motion passed by unanimous vote.

Members of the Board made positive comments.

DRAFT

Mr. Ulmer asked that Dr. Barbosa's personal address be redacted from the contract.

4. **Director's Report**

   Dr. Barbosa welcomed a new member, Mr. Scott Taggart, who could not be present last month to introduce new members.

   Dr. Barbosa noted that, effective July 1st, the State discontinued or renamed local contractor licenses and that municipalities are adjusting to the extent possible.

   Dr. Barbosa supported the life-saving throw-a-ring initiative to install rings adjacent to waterways. At the County Commission's urging, she plans to bring the initiative to the attention of city commissions throughout Broward County.

   Dr. Barbosa advocated for the Consumer Protection Department's staffing in the face of issues resulting from the July 1st discontinuation of local contractor licenses.

5. **Attorney's Report**

   Mr. Kramer advised that three cases have been filed against the Board, and he prevailed in them.

6. **Committee Reports** - none

7. **General Board Member Discussion** - none

8. **Adjournment**

   The meeting adjourned at 7:56 PM.

DRAFT

Consent Agenda:
Item 1

CITY OF COCONUT CREEK
Canfield, Brian, Chief Mechanical Inspector

CITY OF CORAL SPRINGS
Jeoboam, Carpelo, Assistant Building Official

TOWN OF DAVIE
Salas, Gladys, Chief Structural Inspector

CITY OF FORT LAUDERDALE
Travers, John, Building Official

CITY OF HOLLYWOOD
Robinson, Roy, Mechanical Inspector – 120-Day Temporary

CITY OF MARGATE
Young, Marc-Stuart Ameer, Assistant Building Official

CITY OF PEMBROKE PINES
Palma, Emmanuel D., Mechanical Inspector – 120-Day Temporary

CITY OF POMPANO BEACH
Young, Ashlyn, Fire Inspector

COUNTYWIDE
Giunta, John Joseph, Plumbing Plans Examiner
Morgan, Forrest, Plumbing Plans Examiner
Moyal, Henery, Electrical Inspector
Orozco, Jesus A., Structural Inspector
Salas, Gladys, Structural Inspector
Salas, Gladys, Structural Plans Examiner

Regular Agenda:
Item 1

Broward County Board of Rules and Appeals

1 N. University Drive Suite 3500B, Plantation, FL 33324

broward.org/CodeAppeals | 954-765-4500 | rulesboard@broward.org

TO: Members of the Broward County Board of Rules and Appeals

FROM: Chief Structural Code Compliance Officer
Chief Mechanical Code Compliance Officer

DATE: September 11, 2025

RE: Appeal #25-04, Tewfig Alexander Khoury Seeks an Appeal of the Town of Davie Building Official's Actions Pertaining to Permit #2024-6024

Summary of Appeal #25-04

The undersigned Appellant hereby seeks an appeal of the Town of Davie Building Official, Mr. William Diaz's actions pertaining to Permit #2024-6024 in three parts:

- Part 1: Appeal of a determination that the Permit plans called for use of wood trusses and the related determination of compliance with certain sections of the Florida Building Code, Building, Chapter 23, which governs wood trusses.
- Part 2: Appeal of Building Official William Diaz's alteration of Permit records by changing the inspection status of four (4) inspections from "pass" to "fail".
- Part 3: Appeal of a determination that a roofing sub-permit is required.

Appellant's Desired Outcome

To have the Certificate of Completion issued for Davie Permit #2024-6024.

Recommendation

It is recommended that the Board of Rules and Appeals deny, by vote, the appeal submitted by Mr. Tewfig Alexander Khoury AR., referencing Permit #2024-6024, Town of Davie.

Reasons

1. FBCB (2023) Section 2319.10 allows for the roof framing design of wood trusses by a design professional proficient in structural design. These trusses are not considered to be "Prefabricated Wood Trusses" that are manufactured in a controlled environment, such as a manufacturing plant using metal gusset plates, as defined in FBC (2023) Section 2319.17.2. These wood trusses can be constructed on site out of wood by a contractor holding a valid certificate of company.
2. The Building Official is authorized and directed to enforce the provisions of the FBCB, per Section 104.1.2 and approval of an inspection shall not be construed to be an approval of a violation of the provisions of the FBC or of other ordinances of the jurisdiction per Section 110.1.
3. The Building Official has the authority to request a copy of the computations used in the design of the trusses when they feel that sufficient evidence for compliance with the FBC is required per Sections 107.3.4.0.6, 107.3.5.2, and 107.3.5.2.1.
4. Contractor, Ultra Structures, can install the shingle roof on a new building of their own construction per F.S.489.113(3)(b), but a roofing sub-permit is still required per Section 105.1, including the uniform roofing permit application, FBCB, Section 1525.

Additional Information

- Appeal from Mr. Tewfig Alexander Khoury AR.
- Responses to Allegations from Mr. William Diaz, Building Official Town of Davie
- Applicable Code Sections
- Simpson Strong-Tie Data Sheet
- Copy of Submitted Documents

Respectfully Submitted,

Michael Guerasio, Chief Structural Code Compliance Officer

R Soto

Rolando Soto, Chief Mechanical Code Compliance Officer

Broward County Board of Rules and Appeals
1 N. University Drive Suite, 3500B, Plantation, FL 33324
broward.org/CodeAppeals | 954-765-4500 | rulesboard@broward.org

Appeal Application

Appellant Information:

Name Tewfiq Alexander Khoury
Address 3233 S. Andrews Ave.
City Ft. Lauderdale State Fl.
Business/Profession Registered Architect
Phone (954) 523-2685
Email alex@artisticdevelopment.com

Project Information:

Address 9411 Live Oak Pl. #102 Davie, Fl. 33324
Type of Construction Most closely resembles Type III
Hight of Building 20'
Square Footage per Floor Approx. 700 SF this unit
Permit Number Davie 2024-6024
Permit Application Date 7/11/24
Group Occupancy R-2
Number of Stories 2

Office Use Only

Date Of Receipt
Appeal #:
Hearing Date
Notice Mailed
Code In Effect
Electrical
Fire Code
Mechanical
Plumbing
Structural
Alternate Material
Alternate Method

I, the undersigned, appeal the decision of the Building/Fire Code Official of Town of Davie as it pertains to Chapter see narrative, Section see narative, of the (check one):

☐ South Florida Building Code ☒ Florida Building Code ☐ Florida Fire Prevention Code

☐ Other _____, as applicable to Broward County. (Attach copy of relevant Code sections).

Note: The Board shall base their decision upon the section(s) of the Code you have indicated above. If these are in error, you must re-submit your appeal. The Board is not authorized to grant variances from the Code.

Summary of appeal (attach additional sheets as necessary): See narrative attached

Results desired (attach additional sheets as necessary): Issue Certificate of Completion see narrative attached for details.

Fee: Waived

Note: Exhibits intended for distribution to the Board supporting the appeal must be submitted with the appeal. All material shall be kept from the appeal hearing. A letter from the Building or Fire Code Official rejecting the applicant's appeal must be included in the appeal packet submitted to the Board of Rules and Appeals.

Appellant Name (Please Print): Tewfiq Alexander Khoury

Appellant Signature: 

Artistic
Design & Contracting Inc.
3233 S. Andrews Ave. Ft. Lauderdale, Fl. 33316
Phone (954)523-2685 Fax (954) 764-8333

B.O.R.A. Appeal of Davie Building Official William Diaz Actions

July 25, 2025

Broward County Board of Rules and Appeals
1 N. University Dr. Suite 3500B
Plantation, Fl. 33324

To the Board;

As more specifically detailed herein, the undersigned Appellant hereby seeks an appeal of Town of Davie Building Official William Diaz actions pertaining to Town of Davie permit # 2024-6024 (The Permit) in three parts:

- Part 1: Appeal of a determination that The Permit plans called for use of wood trusses and the related determination of compliance with certain sections of the Florida Building Code which governs wood trusses.
- Part 2: Appeal of Building Official William Diaz's alteration of The Permit records by changing the inspection status of four (4) inspections from "pass" to "fail".
- Part 3: Appeal of a determination that a roofing sub-permit is required.

Introduction:

Town of Davie permit #2024-6024 (for convenience hereafter referred to as The Permit) is for an alteration to a single unit with address 9411 Live Oak Pl. #102 Davie, Fl. 33324 which situates within an existing multifamily building. Among other work, said addition included a roof with an overall surface measuring approximately 6.5' x 6.5'. The Permit includes all plans necessary to sufficiently detail the full project scope in compliance with FBC 2023 and such plans were signed and sealed by a Florida Registered Architect (i.e. the Architect of Record hereafter referred to as AOR).

Facts relevant to the issue(s) being appealed in time order.

- The Permit plans provide sufficient detail for the roof framing system, including but not limited to, specifying 2x4 Southern Pine dimension lumber for roof framing members and further specifying to "BUILD EACH MEMBER IN FIELD", see detail 4 sheet S-2, see Exhibits 'A' & 'G'.

- Based on a compressive review of plans bearing the seal of a Registered Architect, The Town of Davie Building Department issued The Permit on 10/24/24, see Exhibit 'A' for The Permit issued plans & Exhibit 'H' for status showing The Permit issue date.
- All construction work was performed in accordance with The Permit plans as evidenced by the pass status for all inspections under The Permit. Notably the Roof Sheathing, Roof Truss Anchor and Roof Truss Engineering all passed on 11/26/24 based on an inspection on the site by comparing the actual construction work to The Permit plans. See Exhibit 'H' for pass status of all inspections and other details of The Permit at completion of construction work.
- The Certificate of Completion (CC) was applied for on 5/21/25 having completed all work, passed all inspections and paid all fees contemplated in The Permit.
- On 5/25/25 Building Official William Diaz issued two comments rejecting the CC. Because The Permit plans do not specify wood trusses and because the CC rejection comments occurred after permit issuance, the CC rejection comments requiring wood truss shop drawings represent a substantive change to the plans after permit issuance. The CC rejection comments did not identify the specific plan features that do not comply with the applicable codes, nor did said CC rejection comments identify the specific code chapters and sections upon which the rejection was based, see Exhibit 'M' for the CC rejection comments.
- On 5/27/2025, the AOR had a telephone conversation with Building Official William Diaz for the purpose of amicably resolving the CC rejection comments. The AOR referenced The Permit plans citing the plain language clearly shown on the plans which stated "BUILD EACH MEMBER IN FIELD" and further explained that the design, the plan details and the plain language on the plans specified field framing for the roof which is distinct and different to wood trusses. In reply, Building Official William Diaz stated that he had made a determination that the plans called for wood trusses but refused to provide a citation to the FBC in support of such determination upon request by the AOR. After repeatedly asking for the citation to FBC to support a determination that wood truss shop drawings shall be submitted for the field framing shown on The Permit, Building Official William Diaz stated "Go Google it", to which the AOR replied "This is not a sufficient response, my design does not call for wood trusses, so you cannot make a determination that differs from my design and signed / sealed plans without a citation to the FBC in support." Despite the AOR's repeated requests for citations to FBC to support the determination, Building Official William Diaz failed to provide any FBC citation during said phone call. During said phone call, Building Official William Diaz made certain comments that did not comport with professional decorum, specifically.
    - A) In an attempt to convince the AOR to agree with his determination requiring wood truss shop drawings (absent citation to FBC), Building Official William Diaz stated "I am an engineer". The AOR asked William Diaz if he was a P.E. (Professional Engineer) to which William Diaz replied "No." The AOR then asked William Diaz (twice) where he received his Engineering Degree and William Diaz refused to answer both times.
    - B) After the above, Building Official William Diaz chided the AOR with an unfounded accusation of professional negligence by stating "...you should have known better than to sign and seal the drawings as they were, instead of submitting wood truss shop drawings.".

- Thereafter, the AOR had a discussion with Jack Morell (Structural staff at BORA), the discussion focused in general terms on the difference between wood trusses and field framing. Jack Morell agreed that if the drawings specify field framing then that is different from wood trusses; therefore, compliance with FBC sections related to wood trusses shall not apply to field framing. Jack Morell further stated that there is a clear distinction between wood trusses and field framing, "...in my mind, if it's built in a factory with metal plates and arrives on a truck then it is a wood truss, if it's built on site with lumber it's field framing. There's no question in my mind that these two are different..."
- Thereafter the AOR had a conversation with Philip Holste at the Town of Davie Town Administrator's office asking for their intervention with their employee (Building Official William Diaz) because the Building Official's CC rejection comments were an improper attempt to alter a Registered Architect's signed and sealed design drawings and also because the Building Official's CC rejection comments represented a substantive change to the plans after permit issuance without citations to the plan or FBC and this violated Florida statute 553.79. During the conversation, Philip Holste conveyed that Building Official William Diaz had spoken with Jack Morell (structural staff at BORA) and that William Diaz "did not get what he wanted" meaning that Jack Morell disagreed with William Diaz's determination that wood truss shop drawings are required. After said conversation, on 6/19/25, the AOR composed and sent an email to Philip Holste, see Exhibit "N" for full email including attachments thereto.
- On Sat 6/21/25, 2 days after sending the email to the Town Administrator's office, Building Official William Diaz altered The Permit records by changing the status of four (4) different inspections from "pass" to "fail" and cited plan review comments as reason. See Exhibit "J" for details on all four altered inspections.

Appeal:

Part 1: Basis to Appeal Town of Davie Building Official William Diaz's Determination that The Permit plans called for wood trusses and the related determination of compliance with certain sections of the Florida Building Code which governs wood trusses

- Sheet S-2 of The Permit shows the roof framing configuration and other important details required by FBC-B 2023 section 2319.10. Importantly, detail 4 on sheet S-2 details the construction of the roof framing members by utilizing 2x4 Southern Pine dimension lumber and said detail clearly specifies to "BUILD EACH MEMBER IN FIELD", which means the Contractor shall furnish this work, this work is NOT designed and furnished by others. Based on a plain reading of the text in The Permit plans, premanufactured wood trusses shall NOT be used for this roof. Reference sheet S-2 in Exhibits 'A' and 'G'.
- FBC-B 2023 table 1607.1 requires a minimum roof Live Load of 20 PSF for the type of roof specified in The Permit because, in this case The Permit roof is a non-occupiable pitched roof (with shingles). Reference highlighted sections of Exhibit 'B'.

- FBC-B 2023 table 1604.3 sets deflection limits for certain roof members, in this case The Permit roof rafter does not support ceiling; therefore, the deflection limit for The Permit roof rafter is L/180. Reference highlighted sections of Exhibit 'C'
- Exhibit 'D' shows FBC-B 2023 section 2314 and includes sub-section 2314.4 which specifically adopts certain standards into the FBC for use in HIGH-VELOCITY HURRICANE ZONES. Sub-section 2314.4.7 (1) specifically adopts AWC NDS supplement which contains a table titled "Reference Design Values for Visually Graded Southern Pine Dimension Lumber" that is shown in Exhibit 'F'. Also, sub-section 2314.4.7 (3) specifically includes the standard titled Span Tables for Joists and Rafters-2015 published by American Wood Council (AWC ST JR-2015: Span Tables for Joists and Rafters) and this adopted standard is shown at Exhibit 'E'. Specifically adopting and including the aforementioned standards has the same effect as printing the information from such standards directly in the Florida Building Code.
- During periodic inspections of the project depicted in The Permit, the AOR took certain photographs to document the work. Exhibit 'K' is a close-up view of one such photograph showing an ink stamp 'grade marking' compliant with Southern Pine Inspection Bureau (SPIB) and such stamp is found on the roof framing member that was built in the field. The 'grade mark' (Exhibit 'K') for the 2x4 Southern Pine used to construct the roof framing members shows that such lumber was graded No. 2.
- AWC ST JR-2015: Span Tables for Joists and Rafters (Exhibit 'E') contains tables which show the maximum span of dimension lumber joists and rafters under certain loading conditions. To select the correct table, reference highlighted parts of FBC-B 2023 table 1607.1 found at Exhibit 'B' and highlighted parts of FBC-B 2023 table 1604.3 found at Exhibit 'C'. Required information to select the correct row / column in the table is highlighted in the adopted standard found at Exhibit 'F' which shows that No. 2 Southern Pine 2" wide lumber has a bending stress equal to 1,100 PSI and a Modulus of Elasticity equal to 1,400,000 PSI. Utilizing the dimensions shown on the roof framing plan depicted on sheet S-2 of The Permit (Exhibits 'A' & 'G'), the computed spacing of the roof framing members = 18" o.c.
    - AWC ST JR-2015 Applicable table R-13 is used for the rafter not supporting a ceiling with a deflection limit of L/180 and loading of 20 PSF Live Load. Accordingly, the maximum span of 6'-10" for a 2x4 rafter is found at the intersection of the bending design value column (1,100 PSI) and the rafter size and spacing row (2x4 at 19.2").
    - AWC ST JR-2015 Applicable table C-1 is used for the ceiling joist supporting only drywall ceiling (i.e. nonplaster ceiling) with a deflection limit of L/240. Accordingly, the maximum span of 10'-2" for a 2x4 ceiling joist is found at the intersection of the Modulus of Elasticity column (1.4 M PSI) and the joist size and spacing row (2x4 at 19.2").

- Exhibit 'L' shows the completed roof with a measuring tape running along the span direction of the top surface formed by the sloped rafter, the total distance from bearing to edge of overhang = 78" or 6'-6". The angle of the sloped rafter is 18.6 degrees or approximately 4:12 pitch; therefore, the horizontal projection of the rafter from bearing to roof overhang = 6'-2". According to the explanation of tables found in AWC ST JR-2015 (Exhibit 'E'), the span is measured from face to face of the supports and because The Permit roof uses a sloping rafter, the span is measured along the horizontal projection. Accordingly, the actual span of the roof framing members (both rafter and ceiling joist) shown in The Permit plans = 4'-6" and such dimensions are overlaid onto detail 4, sheet S-2 of Exhibit 'G'.
- As demonstrated above, a plain reading of only the text found in the 2023 FBC permits a single 2x4 No.2 Southern Pine member to be utilized (by itself and without support from additional framing members) as a roof rafter because the actual construction clear span in The Permit = 4'-6" and this is LESS than the maximum allowable span of 6'-10" shown in FBC.
- As demonstrated above, a plain reading of only the text found in the 2023 FBC permits a single 2x4 No.2 Southern Pine member to be utilized (by itself and without support from additional framing members) as a ceiling joist because the actual construction clear span in The Permit = 4'-6" and this is LESS than the maximum allowable span of 10'-2" shown in FBC.
- Detail 4 on sheet S-2 of Exhibit 'G' graphically depicts a distinct roof rafter (shown in green) and a distinct ceiling joist (shown in blue) both of which are overlaid onto the roof framing member shown at detail 4 of The Permit plans. Additionally, dimensions, spans and certain aforementioned notes are also overlaid onto said detail 4 of sheet S-2 Exhibit 'G'. As detailed above and according to 2023 FBC, the roof rafter specified as a 2x4 Southern Pine on detail 4 sheet S-2 of Exhibit 'G' is sufficient (by itself and without support from additional members) for its intended use under the conditions and design contemplated in The Permit. Furthermore, as detailed above and according to 2023 FBC, the ceiling joist specified as a 2x4 Southern Pine on detail 4 sheet S-2 of Exhibit 'G' is sufficient (by itself and without support from additional members) for its intended use under the conditions and design contemplated in The Permit. In fact, because The Permit actual rafter span is 65% of the maximum allowable in 2023 FBC and because The Permit actual ceiling joist span is 44% of the maximum allowable in 2023 FBC, each member as specified and constructed has a factor of safety over and above that which has already been incorporated into the span tables. Stated differently, a single 2x4 roof rafter and a single 2x4 ceiling joist specified in The Permit, each by itself, exceeds the minimum applicable standards in 2023 FBC.
- Although the above demonstrates that a single 2x4 roof rafter and a separate 2x4 ceiling joist (each by itself) exceeds the minimum requirements of 2023 FBC, the AOR choose to further increase the strength of the design by specifying 2x4 roof framing members in addition to the single rafter and ceiling joist thereby far exceeding the minimum requirement of 2023 FBC. The AOR's choice to far exceed the minimum standards in 2023 FBC does not transform the design into something different than the clear wording shown on The Permit plans which was "BUILD EACH MEMBER IN FIELD", i.e. the roof framing specified by the AOR is NOT a wood truss.

- The Permit record does not contain a single instance where Building Official William Diaz cited the plan features which do not comply with applicable parts of FBC in violation of Florida Statutes 553.79 4 (b) and 553.79 1 (f) 2 a 1.

The designed roof framing depicted on The Permit plans which bear the seal of a Registered Architect, specifies 2x4 Southern Pine lumber for field framed rafters and ceiling joists which, based on a direct reading of the plain language contained in the 2023 FBC shown in this appeal, demonstrably exceeds all applicable minimum standards in 2023 FBC. Under the circumstances of this permit, 2023 FBC permits a single 2x4 Southern Pine member to be used as a roof rafter and also permits a separate single 2x4 Southern Pine member to be used as a ceiling joist without the need for support from additional framing members. The Permit plans specify a single 2x4 Southern Pine member to be used as a roof rafter and a separate single 2x4 Southern Pine member to be used as a ceiling joist and additionally shows other framing members which only serve to far exceed the minimum requirements of 2023 FBC.

In conclusion, the AOR designed and detailed roof framing shown on The Permit plans which specified that such roof framing shall be built in the field using dimensional lumber and also demonstrated that such roof framing far exceeds the minimum standards in the 2023 FBC as set forth herein. Importantly, the AOR did not specify wood trusses to be used as roof framing members on The Permit plans; therefore, any determination to comply with standards applicable to wood trusses represents a substantive change to the design clearly shown on the AOR's signed and sealed plans in The Permit. Under these circumstances where the AOR's design was demonstrably stronger than the minimum required by 2023 FBC, no determination which makes substantive changes to the AOR's signed and sealed design plans may be held valid absent competent support demonstrating the AOR's design in fact fails to meet applicable sections of 2023 FBC or professional standards of care.

Part 2: Basis to Appeal Building Official William Diaz's alteration of The Permit records by changing the status of four (4) inspections from "pass" to "fail".

On Saturday 6/21/25, two days after the AOR composed and sent the email shown in Exhibit "N" to Davie Town Administrator's office, Building Official William Diaz altered the Town of Davie permitting system records of The Permit by changing the status for four (4) different inspections from "pass" to "fail", see Exhibit "I" for the inspection status after altering The Permit records and also see Exhibit "J" for a composite of all 4 inspections altered and the cited reasons. The reasons William Diaz cited for altering The Permit record by changing the status of 4 inspections from "pass" to "fail" is "due to" the following, cited here for convenience "*FBC Building 2023, 8 Edition, Section 2319.10 Roof framing. The permit documents shall include roof framing plans showing spacing and spans of all roof members indicating any fabricated elements to be designed and furnished by others and shall include the details for support and bearing of the roof structural system, for the permanent cross/lateral/diagonal bracing and anchorage required to resist dead, live and wind loads as set forth in Chapter 16 (High-Velocity Hurricane Zones). The framing plans shall also indicate the uplift forces applied on the roof, sheathing type, thickness and nailing requirements for the sheathing. The roof framing plans shall be prepared by, and bear the sign and seal of, a registered professional engineer or registered architect of record proficient in structural design. FBC Building 2023, 8 Edition, Chapter 23, Section 2303.4, 2303.1.1.*". The structural final inspection was revoked due to the foregoing in addition to "*FBC 2303.4.1.1. and FBC Building 2023, 8 Edition, Chapter 1, Section 105.1 Roof installation without permit*." William Diaz's alteration of The Permit records to change the status of four (4) inspections from "pass" to "fail" was improper as detailed below.

- Building Official William Diaz was not the inspector for any of the 4 altered inspection records and at the time that William Diaz altered The Permit records by changing the status from "pass" to "fail" for all 4 inspections he did not possess any facts that the previously inspected work as constructed in the field failed to comply with The Permit or FBC to support such an action. Importantly, no such facts were cited for the aforementioned alteration of The Permit records.
- Building Official William Diaz altered The Permit record by changing the status of four (4) inspections from "pass" to "fail" by citing reasons which were of a plan review nature after permit issuance and after a different inspector confirmed that the actual construction work complied with The Permit and FBC. Issuing and addressing 'plan review comments' occurs PRIOR to permit issuance and shall not occur after permit issuance absent competent support that the plans fail to meet applicable sections of FBC – competent support necessarily includes a citation to the plan feature which does not comply with FBC as well as citation to the applicable section of FBC. Importantly, William Diaz did NOT cite the plan features that failed to comply with FBC in his reasons for altering The Permit record for 4 inspections.

- A competent review of The Permit plans readily verifies the presence of all plan review comments cited by William Diaz as his reason to alter The Permit records by changing the status of four (4) inspections from "pass" to "fail". Stated differently, The Permit was issued because, at the time of permit issuance, the plans already clearly showed each and every plan feature that William Diaz cited as justification to alter the pass status of 4 inspections, and all such plans bear the seal of a Registered Architect. Importantly, detail 4 on sheet S-2 clearly specifies that the roof framing members shall be built in the field which means that the Contractor shall build all roof framing members together with the other work shown on The Permit, i.e. the roof framing work is NOT designed and furnished by others.
- Building Official Wiliam Diaz cited FBCB 2303.4 as reason to alter The Permit records by changing the status of four (4) inspections from "pass" to "fail"; however, such section pertains to premanufactured wood trusses which are different from the field framed roof system which the AOR designed and clearly specified on The Permit plans. Additionally, prior to altering the inspection records, a Registered Architect, Professional Engineer and BORA structural staff all advised Building Official William Diaz that FBC sections pertaining to wood trusses are not applicable to The Permit because it clearly specifies a different roof framing system that is built in the field. Therefore, William Diaz knowingly failed to cite an applicable code as reason to alter the inspection records.
- Building Official Wiliam Diaz cited FBCB 2303.1.1 as reason to alter The Permit records by changing the status of four (4) inspections from "pass" to "fail". The cited section specifies that sawn lumber must be graded and identified by a "grade mark". The nature of this code section requires that an inspector observe the actual lumber used in construction to determine if the lumber in fact contains such "grade mark" stamp. William Diaz was not the inspector for any of the 4 inspections for which he altered the "pass" status; therefore, William Diaz did NOT possess any facts relevant to this cited FBC section when he altered The Permit inspection records.
- Building Official Wiliam Diaz cited FBCB 2303.4.1.1 as reason to alter The Permit records by changing the status of the Structural Final inspection from "pass" to "fail"; however, such section specifies requirements to be shown on shop drawings for premanufactured wood trusses. The roof framing plan on sheet S-2 of The Permit clearly specifies that the roof framing members are built in the field, which means the roof framing members are NOT premanufactured wood trusses, so wood truss shop drawings were NOT contemplated in The Permit. Stated differently, premanufactured wood truss shop drawings are completely different to the AOR's design which was clearly specified on the signed and sealed plans contained in The Permit. Additionally, prior to altering this inspection record, a Registered Architect, Professional Engineer and BORA structural staff all advised Building Official William Diaz that FBC sections pertaining to wood trusses are not applicable to The Permit because it clearly specifies a different roof framing system that is built in the field. William Diaz knowingly failed to cite an applicable code as reason to alter the inspection records.

- Building Official William Diaz cited FBC-B 2319.10 and copied and pasted the text from said section as reason to alter The Permit records by changing the status of four (4) inspections from “pass” to “fail”. FBC-B 2319.10 includes certain plan features that a roof framing plan must contain, each and every plan feature in FBC-B 2319.10 that William Diaz cited as reason to alter The Permit records by changing the status of four (4) inspections from “pass” to “fail” is identified with a red oval on the plans in Exhibit “G”. Accordingly, at the time of permit issuance, each and every plan feature in FBC-B 2319.10 that William Diaz cited as reason to alter The Permit records by changing the status of four (4) inspections from “pass” to “fail” were already clearly shown on The Permit plans.

In conclusion, Building Official William Diaz’s alteration of The Permit records by changing the status of four (4) inspections from “pass” to “fail” was improper because.

- William Diaz was not the original inspector
- William Diaz did not possess any facts that the original inspections were improper
- William Diaz cited plan review comments which occur prior to permit issuance.
- William Diaz cited inapplicable FBC sections
- William Diaz cited required plan features that were already clearly shown on the plans.

Accordingly, because there was no proper basis to alter the inspection status as detailed above, the previously correct “pass” status for the inspections prior to William Diaz’s improper alteration of The Permit records should be restored.

Part 3: Basis to Appeal a determination that a roofing sub-permit is required.

Building Official Wiliam Diaz cited FBCB 105.1 as reason to alter The Permit records by changing the status of the Structural Final inspection from “pass” to “fail”; however, FBC administrative code 105.2 (H) exempts roof permits for work not exceeding $1,500.00 - in this case, roof work was $550.

The construction work in The Permit is exempt from a roofing sub-permit.

List of Exhibits to this Appeal:

Exhibit ‘A’ – Composite of all original (unaltered) signed and sealed plans stamped approved and contained within Town of Davie issued permit # 2024-6024. Note: each sheet must remain as a separate file to preserve digital signature.
Exhibit ‘B’ - 2023 FBC-B Table 1607.1 ‘Minimum Uniformly Distributed Live Loads’ for a roof with parts highlighted that are applicable to The Permit.
Exhibit ‘C’ – 2023 FBC-B Table 1604.3 ‘Deflection Limits’ for a roof with parts highlighted that are applicable to The Permit

List of Exhibits to this Appeal continued:

Exhibit 'D' – 2023 Section 2314 with parts highlighted that are applicable to The Permit, including but not limited to, HIGH-VELOCITY HURRICANE ZONES, section 2314.4 which adopts referenced standards into FBC, and 2314.4.7 (3) specifically adopting American Wood Council "AWC ST JR-2015: Span Tables for Joists and Rafters".
Exhibit 'E' – American Wood Council Span Tables for Joists and Rafters 2015, i.e. AWC ST JR-2015: Span Tables for Joists and Rafters with Tables highlighted that are applicable to The Permit
Exhibit 'F' – American Wood Council Design Values for Wood Construction – NDS Supplement, Reference Design Values for Visually Graded Southern Pine Dimension Lumber (2" – 4" thick) with parts highlighted that are applicable to The Permit
Exhibit 'G' – Composite of sheets A-2 and S-2 which are signed and sealed plans stamped approved and contained within Town of Davie issued permit # 2024-6024. Each sheet contains an overlay of notes and circles which are pertinent to this appeal. Note: each sheet must remain as a separate file to preserve digital signature.
Exhibit 'H' – Print out from Town of Davie Permitting system showing status of The Permit at application for Certificate of Completion (CC) on 5/21/25.
Exhibit "I" – Print out from Town of Davie Permitting system showing the status of The Permit after Building Official William Diaz altered The Permit record by changing the status of four (4) inspections from "pass" to "fail" on 6/21/25.
Exhibit "J" – Composite of each of four (4) inspection comments under The Permit which were altered by Building Official William Diaz by changing the status from "pass" to "fail".
Exhibit "K" – Close up of roof framing member "Built in Field" showing 'grade marking' stamp compliant with Southern Pine Inspection Bureau (SPIB) ink stamp grade marks.
Exhibit "L" – Picture of surface of completed roof with measuring tape showing distance along top of rafter.
Exhibit "M" – Town of Davie permitting system printout of Certificate of Completion rejection comments.
Exhibit "N" – Email composed by AOR and sent to Philip Holste at Town of Davie Town Administrator's office.
Exhibit "O" – Signed and Sealed Peer Review letter from Mark Johnson, P.E. in support of part 1 of this appeal.

Respectfully Submitted

Tewfiq Alexander Khoury
Registered Architect – AR91487

From:

William Diaz
Building Official
Building Division of Town of Davie
Wdiaz@Davie-fl.gov.
954-797-1138

Date: 08/18/2025

To:

Broward County Board of Rules and Appeals
1 N University Dr #3500b, Plantation, FL 33324

Subject: Response to Appeal Regarding the Certificate of Compliance denial – Permit number 2024-00006024, Project address, 9411 Live Oak Place, Davie, FL 33324.

Dear Members of the Board,

This letter serves as my formal response to the appeal submitted regarding my decision to deny the Certificate of Completion and revoke prior truss inspections for the above-referenced project.

Background

During the Certificate of Compliance review process, several deficiencies and code violations were identified that directly impacted the structural integrity of the project and the ability to verify compliance with the Florida Building Code (FBC) 2023, 8th Edition – High Velocity Hurricane Zone (HVHZ) requirements, as well as Chapter 1 of the Broward County Administrative Provisions. These issues are detailed below, along with the justification for my actions.

Violations and Regulatory References

1. **Broward County Chapter 1, Section 107.3.4.0.6** For any work involving structural design, the Building Official may require that plans, calculations, and specifications be prepared by a Professional Engineer, regardless of the cost of such work.

    Given the structural nature of the work in question and the lack of adequate engineering documentation—including sealed calculations for uplift, wind loads, and bracing—it was within the Building Official's authority to require engineer-prepared documents. The plans submitted did not meet this threshold, nor were they sealed by a licensed engineer as required, further justifying the rejection.

2. Broward County Chapter 1, Section 107.3.5.5 When applying for a permit, the Architect or Engineer of Record shall provide a framing plan. The truss system designer (delegated engineer) shall submit to the architect or engineer of record a truss system shop drawing that conforms to this framing plan, plus a collation of the applicable truss designs and truss connections that denote their location on the placement plan. The truss system shop drawing does require the seal of an engineer and shall be reviewed and accepted by the architect or engineer of record for conformance to design concepts and load interaction with the building. After the Architect or Engineer of Record has indicated their review and acceptance, the truss system shop drawings, design drawings for individual trusses, and truss-to-truss connection details shall be submitted to the building department. This submittal shall take place prior to the inspection of the foundation. **The designs for individual trusses shall be prepared by an engineer.**

    The truss system shop drawings were not submitted by a delegated engineer, as required. Instead, truss details were provided by a registered architect (Sheet S-2), which does not meet the specific requirement that designs for individual trusses be prepared and sealed by a licensed engineer.

2. Broward County Chapter 1, Section 107.2.1 Information on construction documents. Construction documents shall be of sufficient clarity to indicate the location, nature, and extent of the work proposed and show in detail that it will conform to the provisions of this Code and the FFPC, relevant laws, ordinances, rules, and regulations, as determined by the Building Official or Fire Marshal/Fire Code Official (see also Section 107.3.5.1.) FBC 2023 Building, HVHZ,

    Construction documents lacked sufficient clarity and did not demonstrate compliance with HVHZ provisions. Sheet S-2, detail 3, references a lateral bracing detail for pre-engineered trusses, but this alone does not satisfy the requirement to include

complete, sealed truss placement plans and related engineering. As well, Code reference no in compliance with FBC 2023, 8th Edition, HVHZ.
Chapter 44 does not apply to HVHZ.

3. **FBC 2023 Building, 8th Edition, Chapter 23, HVHZ, Section 2314.1 Design.** Wood members and their fastenings shall be designed to comply with ASCE 7 by methods based on rational analysis or approved laboratory testing procedures, both performed inaccordance with fundamental principles of theoretical and applied mechanics.

No wind load calculations or rational analysis per ASCE 7 were submitted for review, which is a critical omission given the HVHZ requirements.

4. FBC 2023 Building, 8th Edition, Chapter 23, HVHZ, Section 2314.3 Fabrication, and 2314.3.2. Any person desiring to manufacture or fabricate wood truss assemblies shall obtain a certificate of competency from the authority having jurisdiction.

No certificate of competency or approved truss shop drawings from a qualified fabricator was provided.

5. FBC 2023 Building, 8th Edition, Chapter 23, HVHZ Section 2319.10 Roof framing. The permit documents shall include roof framing plans showing spacing and spans of all roof members indicating any fabricated elements to be designed and furnished by others and shall include the details for support and bearing of the roof structural system, for the permanent cross/lateral/diagonal bracing and anchorage required to resist dead, live and wind loads as set forth in Chapter 16 (High-Velocity Hurricane Zones). The framing plans shall also indicate the uplift forces applied on the roof, sheathing type, thickness and nailing requirements for the sheathing. The roof framing plans shall be prepared by, and bear the sign and seal of, a registered professional engineer or registered architect of record proficient in structural design.

Roof framing plans failed to indicate uplift forces, live and wind load per Chapter 16. This level of detail is necessary to verify that the roof structure can resist expected wind loads.

Roof-to-wall anchors provided in the S-2 sheet anchor schedule are not approved for roof trusses to wood walls. See the anchor manufacturer detail provided attached.

6. **Broward County Chapter 1 & FBC 2023 Building, 8th Edition, Chapter 15 – Roofing Permit Violation.**

> The contractor failed to obtain a roofing permit prior to work commencement, violating mandatory permitting procedures.

7. Broward County Chapter 1, Section 111.4 – Certificate Revocation Authority. The Building Official is authorized to serve a notice of the suspension or revocation of the Certificate of Occupancy or Completion, issued under the provisions of this Code, in writing, on the person or persons using or causing the use of a building or structure, wherever the certificate is issued in error, or based on correct information supplied, or where it is determined that the building or structure or portion thereof violates any ordinance, regulation, any of the provisions of this Code or Fire Protection Provisions of this Code and the FFPC. After the receipt of such notice or order, the building or portion thereof shall be brought into compliance with this Code within a reasonable time, as determined by the Building Official.

> Based on the incomplete and noncompliant documentation, a Certificate of Completion issued under such circumstances would be contrary to code. Therefore, it was necessary to deny the Certificate and revoke previously approved roof truss inspections that relied on these insufficient documents.

Justification for Denial and Revocation

The decisions made were based on objective and documented violations of the Florida Building Code and Broward County Administrative Code. At no time was the decision arbitrary or capricious. The truss system and structural plans presented lacked essential engineering review, design data, and proper documentation—elements critical to ensure the safety and code compliance of the structure, especially within an HVHZ jurisdiction.

The revocation of inspections was necessary to maintain the integrity of the permitting and inspection process and to protect public safety. Without verifiable truss shop drawings, uplift calculations, and approved engineering, structural integrity cannot be confirmed.

Conclusion and Recommendations

In light of the documented deficiencies and code requirements cited above, I respectfully reaffirm my decision to deny the Certificate of Completion and revoke the associated inspections.

To resolve this matter, I recommend that the applicant:

- Engage a licensed professional engineer to prepare and seal all required truss documentation.
- Submit wind load and uplift calculations as per FBC and ASCE 7 standards.
- Obtain a valid roofing permit.
- Resubmit a complete, code-compliant set of construction documents for re-evaluation.

I remain available to provide further clarification or work collaboratively with all parties to bring this project into compliance.

Thank you for your attention to this matter.

Respectfully,

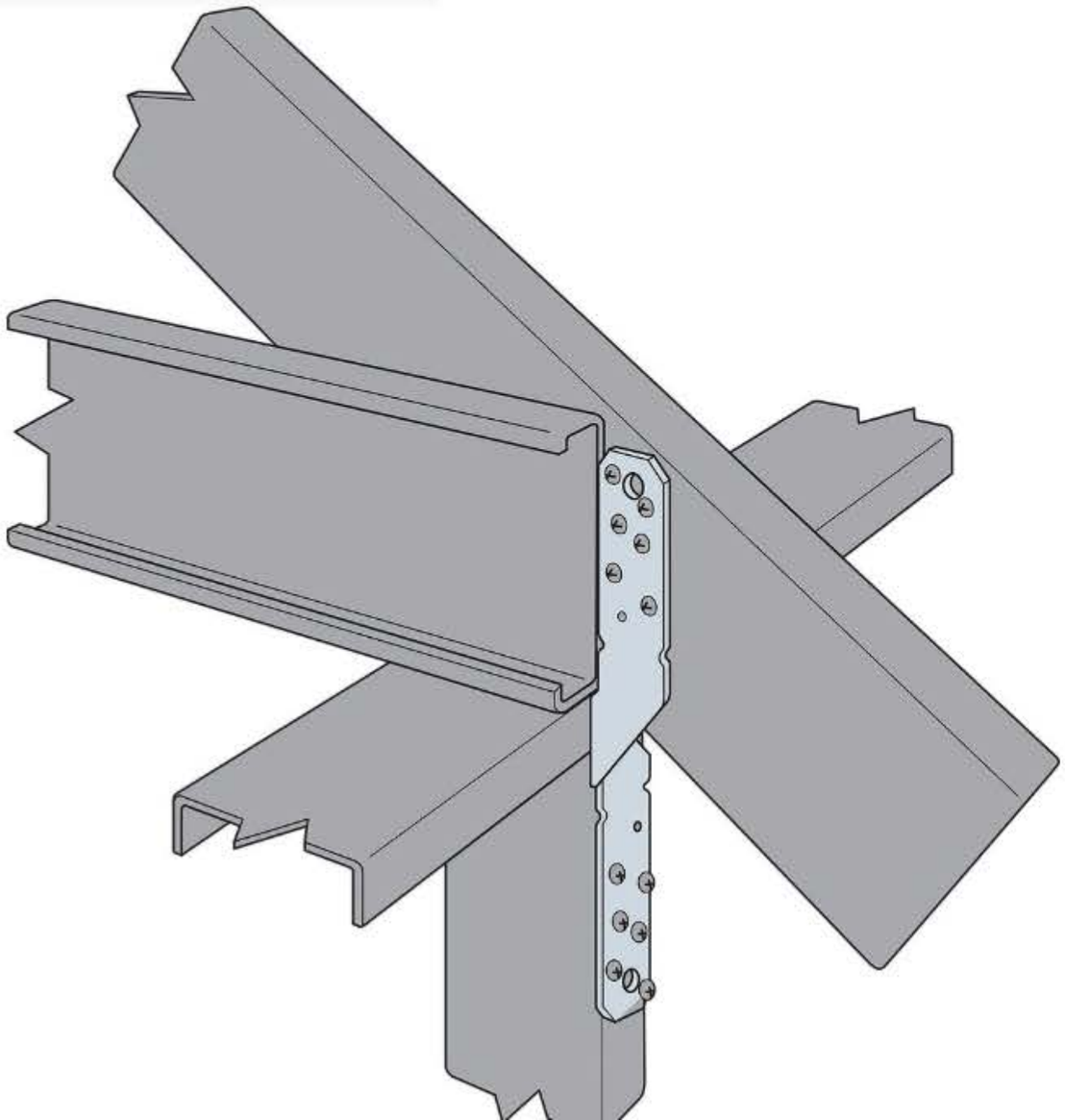
Digitally signed by William Diaz
Date: 2025.08.18 17:23:05 -04'00'

William Diaz

Building Official

Town of Davie Building Department.

Images | Illustration | Installation



MTS Medium Twist Strap

The MTS provides a tension connection between two members. This economical twist strap resists moderate uplift loads at the rafter or heel of a truss. The MTS has a small bend section to reduce interference at the transition points between the two members.

Key Features

- Available with the bend reversed
- Straps do not need to be wrapped over the truss to achieve the allowable load
- Versatile with many lengths offered to fit the specific application
- **View More Product Details**

Find a Dealer

This product's information may differ depending on the category of use. You are currently viewing details related to **Twist Straps**. You can also view product information related to the categories of: Roof Truss and Rafter Connectors, Ties, and Straps for Cold-Formed Steel Construction, Strong-Rod® URS Components.

2024-00006024

Approved
9/5/2024
Raymond Wright
Structural

Plans reviewed and approved by the Official do not relieve the applicant of the responsibility of compliance with the current Florida Building Code.

MR. & MRS. CHRIS & JEN TRAPANI RENOVATION

LOCATION OF SITE FOR WORK UNDER THIS PERMIT.

LOCATION MAP

WORK UNDER THIS PERMIT IS LIMITED TO WITHIN THIS UNIT.

DEFINITION OF UNIT WITHIN SITE.

GENERAL INFORMATION	
LEGAL DESCRIPTION:	
LIVE OAK CONDO FOURTEEN OF PINE ISLAND RIDGE F UNIT 102 PER CDO BK/PG: 5707/85	
OCCUPANCY	
RENOVATION OF EXISTING UNIT 102	RISK CATAGORY – II
MOST CLOSELY RESEMBLES TYPE – V CONSTRUCTION	GROUP – R3
CODE	
F.B.C. 2023 EIGHTH ED.	
PROJECT SCOPE	
RENOVATION OF EXISTING RESIDENTIAL UNIT WITHIN AN EXISTING BUILDING. THE EXISTING STRUCTURE AND COMPONENTS TO REMAIN SHALL NOT BE MODIFIED AND ARE ASSUMED TO COMPLY WITH CODES IN EFFECT AT TIME OF ORIGINAL CONSTRUCTION. CURRENT CODE CITED SHALL ONLY APPLY TO THOSE NEW COMPONENTS THAT ARE SPECIFICALLY SHOWN WITHIN THESE CONSTRUCTION DOCUMENTS WHICH ARE THE SUBJECT OF THE WORK CONTAINED IN THIS PERMIT.	

SHEET LEDGEND	
CS	COVER SHEET
A–1	ARCHITECTURAL PLAN
A–2	EXTERIOR ELEVATIONS AND SECTIONS
DP	DEMOLITION PLAN
S–1	STRUCTURAL FOUNDATION PLAN
S–2	STRUCTURAL FRAMING PLAN
E–1	ELECTRIC PLAN

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL. 33316
OFFICE: (954) 523–2685 ALEX KHOURY – AR91487 FAX: (954) 764–8333
DESIGN / BUILD

DWG. TITLE:

THE ARCHITECT HEREBY RESERVES COMMON LAW COPYRIGHT AND OTHER PROPERTY RIGHTS IN THESE PLANS & DESIGNS. ALL IDEAS CONTAINED HEREIN SHALL NOT BE COPIED, REPRODUCED OR USED IN ANY WAY WHATSOEVER WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ARCHITECT.

PROJECT: Proposed Renovation For:
Mr. & Mrs. Chris & Jen Trapani
PROJECT NO.: 9411 Live Oak Pl. #102
R–23–TR01 Davie, Fl. 33324

REVISIONS:

DWG. SCALE : N.T.S.

DWG. BY: T.A.K.

DRAWING No.: CS | OF 7

SEAL

2024-00006024

Approved
9/9/2024
Raymond Wright
STRUCTURAL
Plans reviewed and approved by the Architect of Record believe the applicable of the responsibility of compliance with the current Florida Building Code.

WALL TYPE LEDGED

DEMO WORK – EXISTING COMPONENT TO BE REMOVED.

NEW EXTERIOR WALL, SEE STRUCTURAL DRAWINGS

EXISTING INTERIOR NON-BEARING PARTITION TO REMAIN

EXISTING EXTERIOR CONC. WALL TO REMAIN.

GENERAL NOTES:

GENERAL DEMO NOTES

1 – IF REQUIRED, ASBESTOS REMEDIATION SHALL COMPLY WITH OSHA STANDARDS, IN ADDITION TO ANY LOCAL AND STATE REQUIREMENTS.

2 – NO STRUCTURAL LOAD BEARING COMPONENTS (WALL, COLUMN, FOOTING, ROOF, ETC.) SHALL BE DEMOLISHED, ALTERED OR REPAIRED UNDER THIS PERMIT.

3 – NO WORK TO EXTERIOR SITE IMPROVEMENTS (I.E. LANDSCAPING OR PARKING LOT) MADE UNDER THIS PERMIT

ELECTRICAL DEMO NOTES:

1 – NO ELECTRIC DEMO THIS PERMIT

2 – EXISTING ELECTRICAL PANEL SHALL REMAIN.

PLUMBING DEMO NOTES:

1 – NO PLUMBING DEMO THIS PERMIT

MECHANICAL DEMO NOTES:

1 – NO MECHANICAL DEMO THIS PERMIT

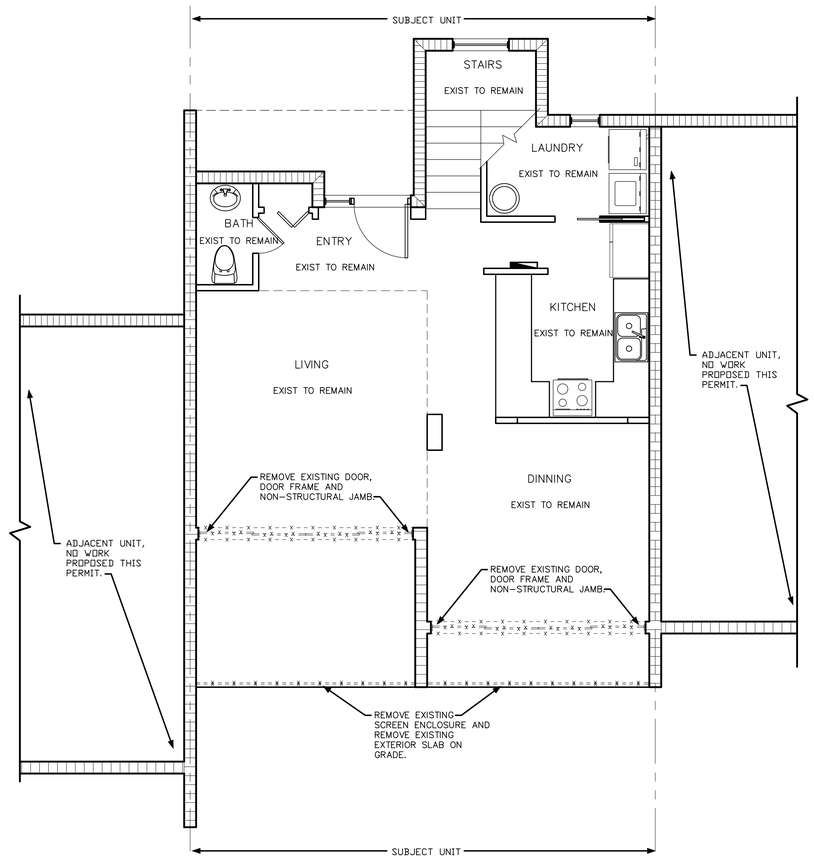
FLOORING DEMO NOTES:

1 – REMOVE EXISTING FLOORING

FENESTRATION DEMO NOTES

1 – REMOVE ALL FENESTRATION WHERE DESIGNATED ON THIS PLAN

2 – CONTRACTOR SHALL ERECT TEMPORARY WALL AT ALL LOCATIONS WHERE FENESTRATION IS REMOVED TO MAINTAIN ENCLOSURE OF THE STRUCTURE.



1 DP DEMO PLAN
1/4" = 1'-0"

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL 33316
ALEX KHOURY – AR91487
DESIGN / BUILD
OFFICE: (954) 523-2685 FAX: (954) 764-8333

PROJECT: Proposed Renovation For:
Mr. & Mrs. Chris & Jen Trapani
9411 Live Oak Pl. #102
Davie, FL 33324
PROJECT NO.: R-23-TR01

DWG. TITLE: DEMO PLAN

THE ARCHITECT HEREBY PRESERVES COPYRIGHT AND OWNERSHIP OF ALL DESIGNS & CONCEPTS CONTAINED IN THIS CONTENT SHALL NOT BE COPIED, REPRODUCED OR WORKS WITHOUT THE EXPRESS WRITTEN

REVISIONS:

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

DWG. BY: T.A.K.

DRAWING No.: DP OF 7

SEAL

2024-00006024

Approved
9/3/2024
Raymond Wright
Structural

Plans reviewed and approved by the structural only. I believe the applicant of the responsibility of compliance with the current Florida Building Code.

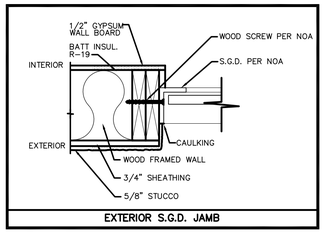
DOOR SCHEDULE

DOOR NO	WIDTH	HEIGHT	THICK	TYPE	PRESSURE + psf	PRESSURE – psf	END ZONE	IMPACT Y/N	M.O.	REMARKS:
1	3'–0"	6'–8"	–	SWING						EXISTING TO REMAIN
2	7'–7"	8'–0"	–	S.G.D.	47.4	57.8	N	Y	93"x97"	SHGC=0.5 / U–FACTOR=1.10
3	12'–3"	8'–0"	–	S.G.D.	47.4	57.8	N	Y	149"x97"	SHGC=0.5 / U–FACTOR=1.10
4	2'–0"	6'–8"	–	SWING						EXISTING TO REMAIN
5	2'–8"	6'–8"	–	POCKET						EXISTING TO REMAIN
6	2'–6"	6'–8"	–	BIFOLD						EXISTING TO REMAIN

ALL NEW DOORS SHALL BE SUPPLIED AND INSTALLED BY OWNER UNDER SEPARATE PERMIT.

WINDOW SCHEDULE

WIN. NO	WIDTH	HEIGHT	TYPE	PRESSURE + psf	PRESSURE – psf	END ZONE	IMPACT Y/N	M.O.	REMARKS:
A	1'–4"	6'–8"	EXIST						EXISTING TO REMAIN
B	3'–0"	4'–0"	EXIST						EXISTING TO REMAIN
C	1'–7"	2'–0"	EXIST						EXISTING TO REMAIN



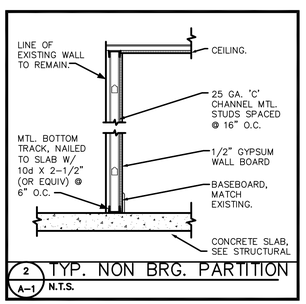
EXTERIOR S.G.D. JAMB

WALL TYPE LEDGED

NEW EXTERIOR WALL, SEE STRUCTURAL DRAWINGS

EXISTING INTERIOR NON–BEARING PARTITION TO REMAIN

EXISTING EXTERIOR CONC. WALL TO REMAIN.



2 / A–1 TYP. NON BRG. PARTITION
N.T.S.

GENERAL NOTES:

– EXISTING COMPONENTS TO REMAIN SHALL NOT BE SUBJECT TO WORK UNDER THIS PERMIT

– ALL NEW COMPONENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH 2023 F.B.C. RESIDENTIAL

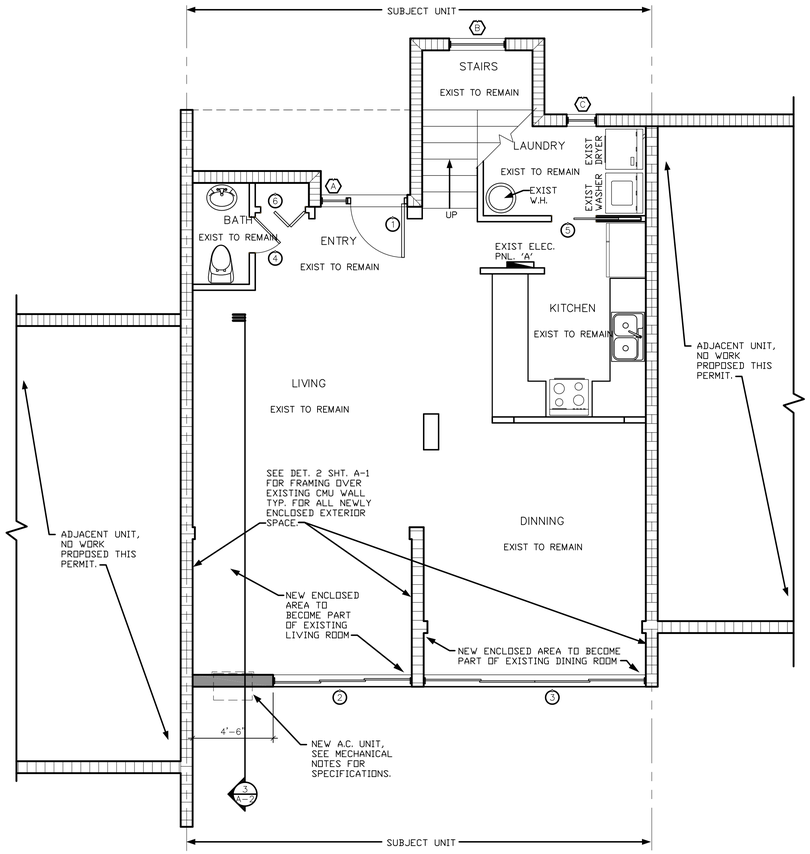
SCOPE OF RENOVATION:

– PLUMBING.
  – NO CHANGES TO PLUMBING SYSTEM PROPOSED UNDER THIS PERMIT.

– ELECTRICAL
  – ALL EXISTING ELECTRICAL COMPONENTS NOT SPECIFICALLY SHOWN ARE EXISTING TO REMAIN.
  – SEE ELECTRIC PLAN FOR NEW DEVICES AND PANEL SCHEDULE

– MECHANICAL
  – INSTALL (1) THRU WALL AIR CONDITIONING SYSTEM WITHIN METAL SLEEVE.
  – A.C. UNIT SHALL BE A KEYSTONE KSTHW08B OR EQUIVALENT
  – A.C. UNIT THRU WALL SLEEVE SHALL BE KSTSLV1 OR EQUIVALENT
  – SEE STRUCTURAL PLANS FOR WALL OPENING

– INTERIOR FINISHES
  – INSTALL NEW FLOOR TILE THROUGHOUT GROUND FLOOR, REMOVE AND REPLACE CABINETRY AS REQUIRED.



1 / A–1 FIRST FLOOR PLAN
1/4"=1'–0"

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL. 33316
ALEX KHOURY – AR91487
OFFICE: (954) 523–2685 FAX: (954) 764–8333
DESIGN / BUILD

DWG. TITLE:

THE ARCHITECT HEREBY RESERVES COPYRIGHT IN THESE DESIGNS & DRAWINGS & CONTENT SHALL NOT BE COPIED, REPRODUCED OR WORKS WITHOUT THE EXPRESS WRITTEN

PROJECT: Proposed Renovation For:
Mr. & Mrs. Chris & Jen Trapani
9411 Live Oak Pl. #102
Davie, FL. 33324
PROJECT NO.: R–23–TR01

REVISIONS:

DWG. SCALE : 1/4" = 1'–0"

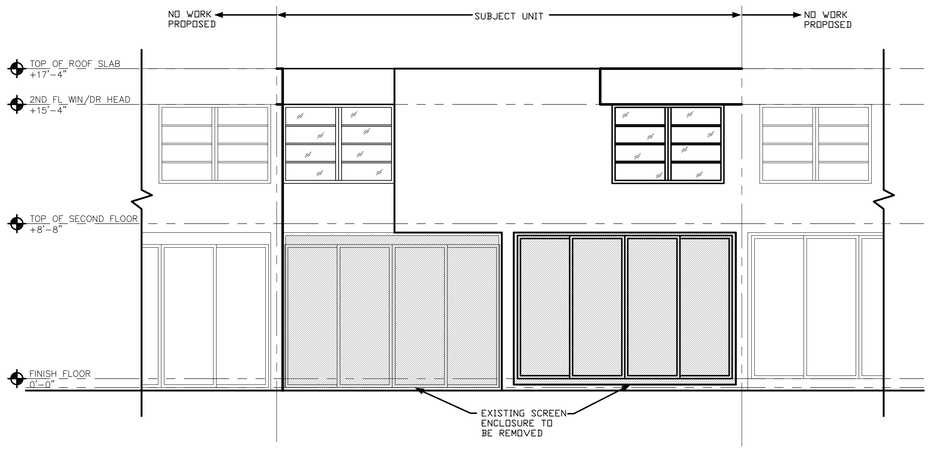
DWG. BY: T.A.K.

DRAWING No.: A–1 OF 7

SEAL

2024-00006024

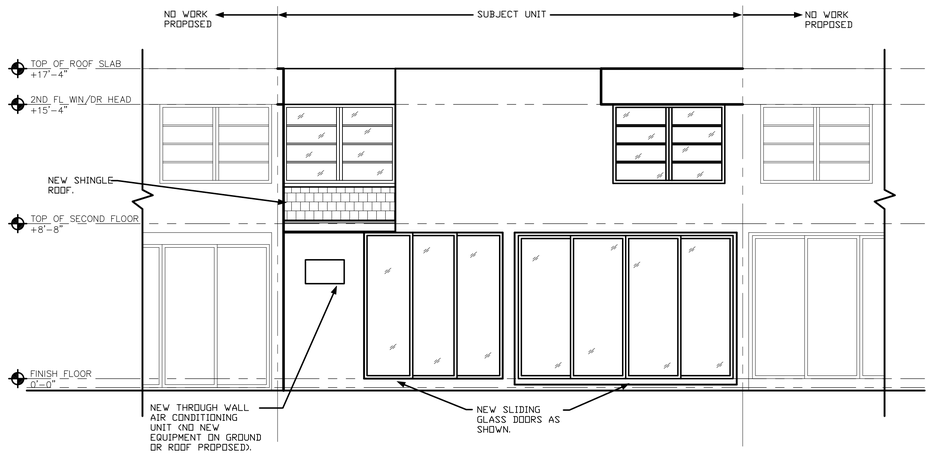
Approved
9/9/2024
Raymond Wright
Structural
Plans reviewed and approved by the Structural Inspector believe the applicant or their agent's responsibility of compliance with the current Florida Building Code.



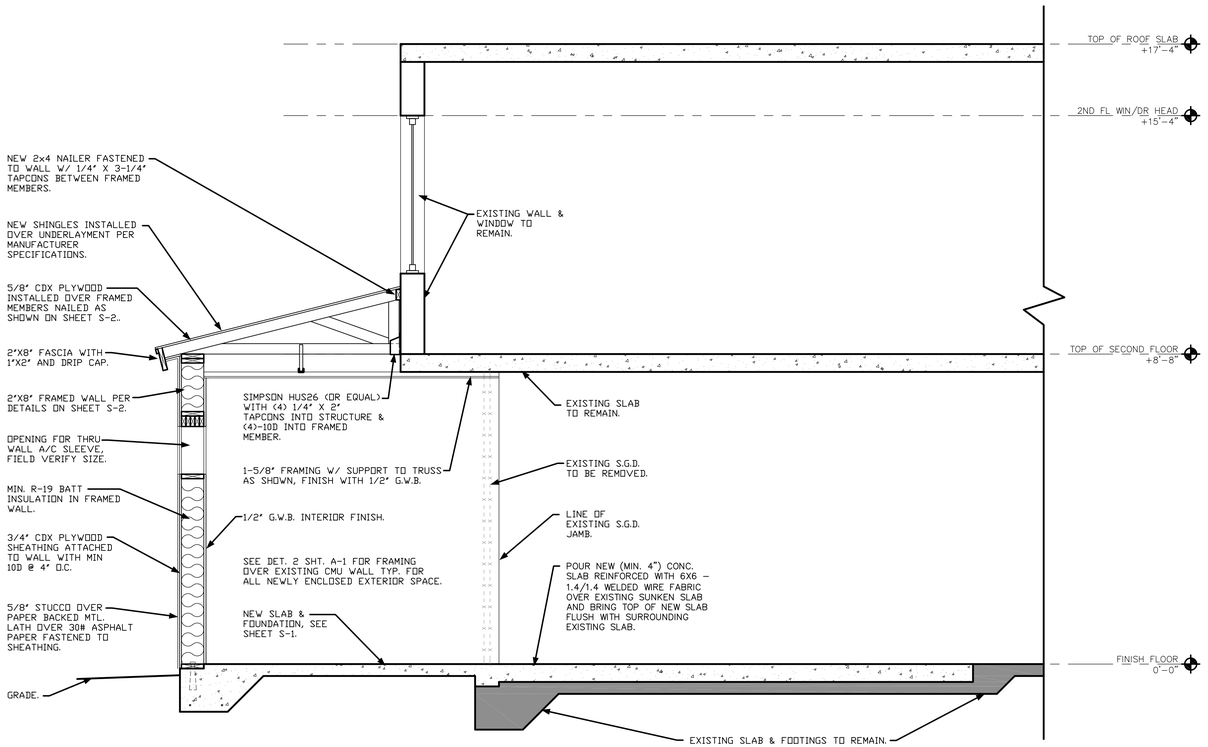
1 A-2 Existing Rear Elevation (Prior to Work Under This Permit)
1/4"=1'-0"

NOTE:

ALL ELEVATIONS NOT SHOWN SHALL REMAIN WITHOUT CHANGES.



2 A-2 Existing Rear Elevation After Completion of Work Under This Permit
1/4"=1'-0"



3 A-2 SECTION A–A
1/2"=1'-0"

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL 33316
OFFICE: (954) 523-2685 FAX: (954) 764-8333
ALEX KHOURY – AR91487
DESIGN / BUILD

DWG. TITLE: Elevations & Section

THE ARCHITECT HEREBY RESERVES COPYRIGHT AND OTHER PROPERTY RIGHTS IN THESE PLANS AND DESIGNS. ALL OR ANY PART OF THE CONTENT SHALL NOT BE COPIED, REPRODUCED OR USED IN ANY WAY WHATSOEVER WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE ARCHITECT.

PROJECT: Proposed Renovation For:
Mr. & Mrs. Chris & Jen Trapani
PROJECT NO.: R-23-TR01
9411 Live Oak Pl. #102
Davie, FL 33324

REVISIONS:

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

DWG. BY: T.A.K.

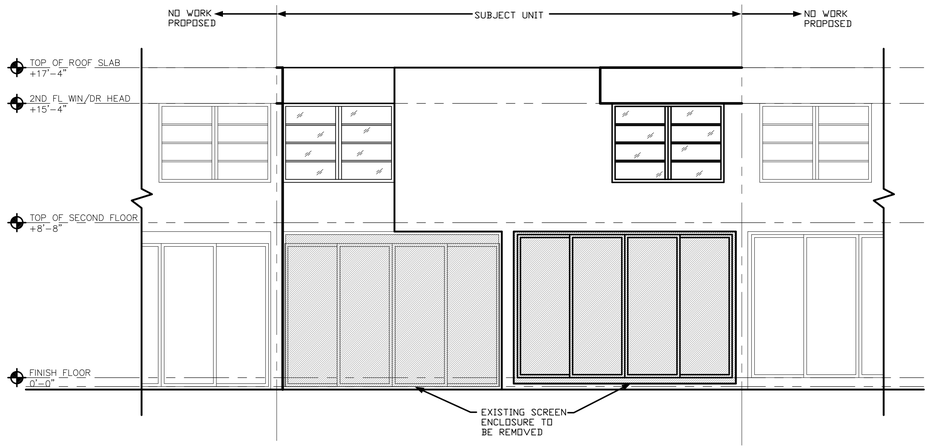
DRAWING No.: A-2 OF 7

SEAL

2024-00006024

Approved
9/9/2024
Raymond Wright
Structural

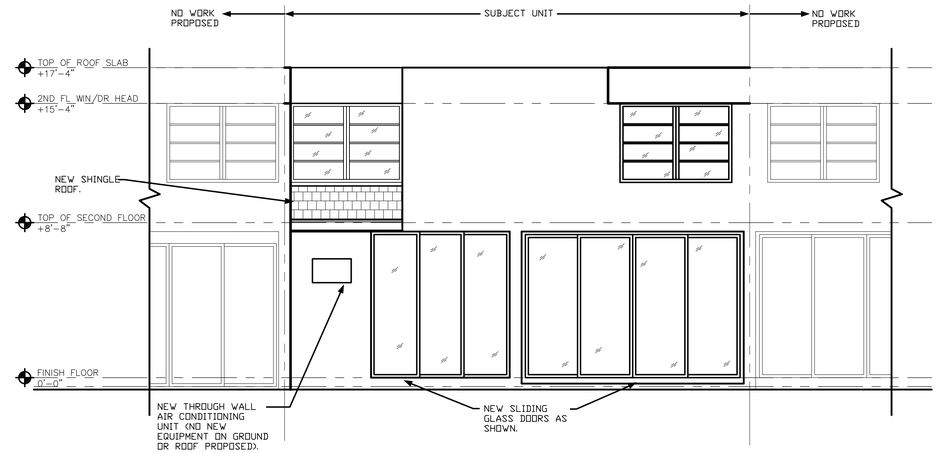
Plans reviewed and approved by the structural official believe the applicant of the responsibility of compliance with the current Florida Building Code.



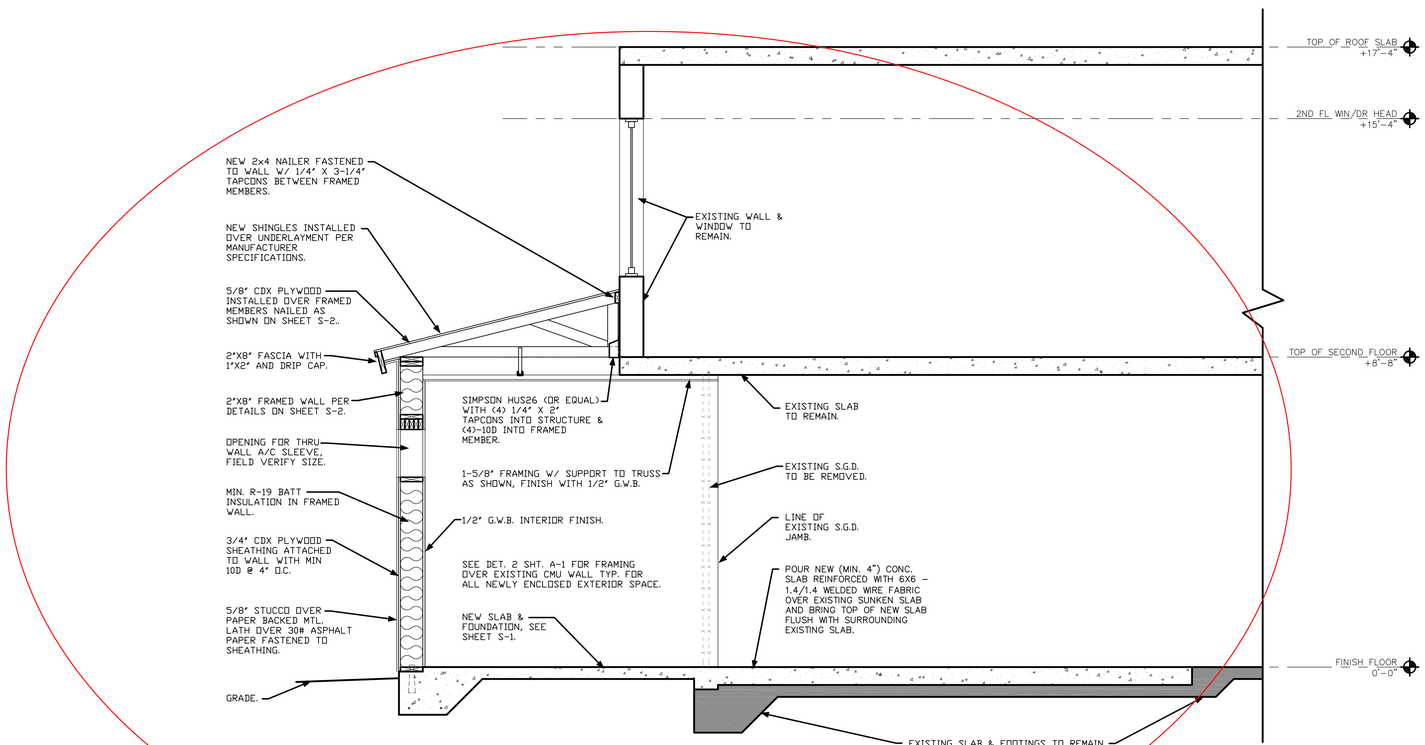
1 A-2 Existing Rear Elevation (Prior to Work Under This Permit)
1/4"=1'-0"

NOTE:

ALL ELEVATIONS NOT SHOWN SHALL REMAIN WITHOUT CHANGES.



2 A-2 Existing Rear Elevation After Completion of Work Under This Permit
1/4"=1'-0"



3 A-2 SECTION A–A
1/2"=1'-0"

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL 33316
OFFICE: (954) 523-2685 FAX: (954) 764-8333
ALEX KHOURY – AR91487
DESIGN / BUILD

DWG. TITLE: Elevations & Section

THE ARCHITECT HEREBY RESERVES COPYRIGHT AND OTHER PROPERTY RIGHTS IN THESE PLANS. ALL REPRODUCTION OR USE OF THE DESIGN OR OTHER CONTENT SHALL NOT BE COPIED, REPRODUCED OR USED FOR ANY WORKS WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ARCHITECT.

PROJECT: Proposed Renovation For:
Mr. & Mrs. Chris & Jen Trapani
PROJECT NO.: R-23-TR01
9411 Live Oak Pl. #102
Davie, Fl. 33324

REVISIONS:

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

DWG. BY: T.A.K.

DRAWING No.: A-2 OF 7

SEAL

2024-00006024

Approved
9/9/2024
Raymond Wright
Structural

Plans reviewed and approved by the above signed do not relieve the applicant of the responsibility of compliance with the current Florida Building Code.

WALL TYPE LEDGED

NEW EXTERIOR WALL, SEE STRUCTURAL DRAWINGS

EXISTING INTERIOR NON-BEARING PARTITION TO REMAIN

EXISTING EXTERIOR CONC. WALL TO REMAIN.

FOOTING SCHEDULE

F1		16"X16" W. MONOLITHIC FOOTING W/ (2)#5 CONT., DOUBLE W.W.M 30" BEYOND BACK OF FOOTING, #4 5'-0" L. TRANSFER BAR @ 24" O.C.

GENERAL NOTES:

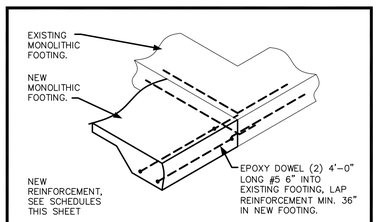
CONCRETE & REBAR:

REBAR
- ALL REBAR SHALL HAVE A MIN. YIELD STRENGTH OF Fy=60 K.S.I.
- REBAR CONCRETE COVER SHALL BE MIN. 3" IN FOOTING & 2" IN BEAMS.
- REBAR IN GROUTED CELLS SHALL BE PLACED IN CENTER OF CELL U.O.N.
- MIN. DEVELOPMENT LENGTH FOR REBAR CONTINUITY SHALL BE 48 x BAR DIA.
- CONTINUITY FOR ALL CORNERS SHALL BE ACHIEVED UTILIZING A CORNER BAR OF EQUAL DIAMETER W/ MIN. 36" LENGTH ON EACH LEG.

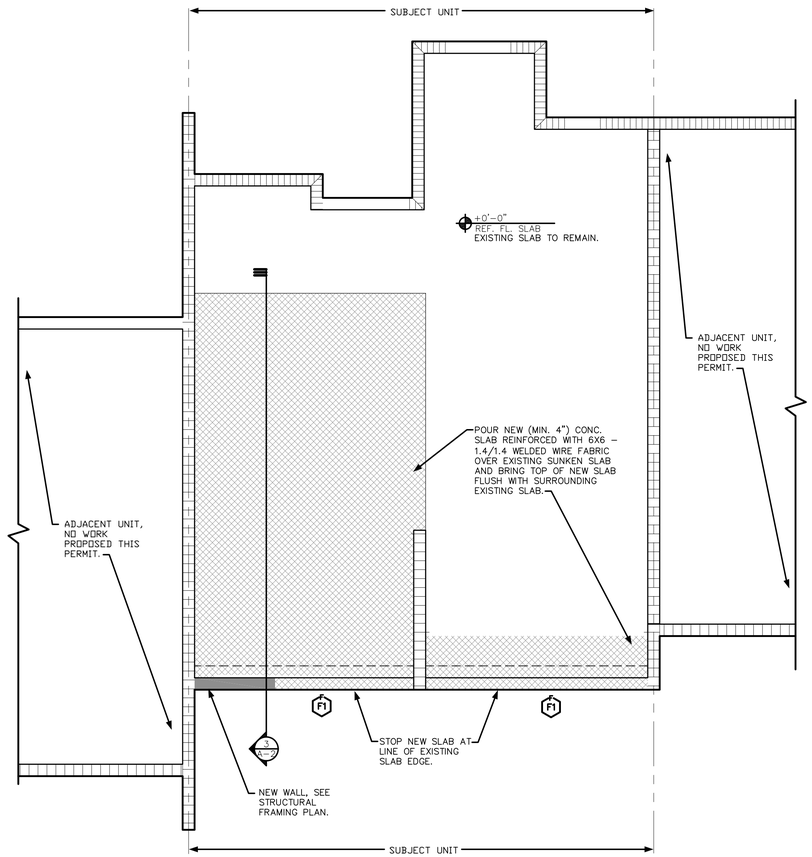
CONCRETE
- CONCRETE & GROUT SHALL HAVE A MIN. COMPRESSIVE STRENGTH OF F'c=3.0 K.S.I. @ 28 DAYS
- ALL GROUT IN FILLED CELLS SHALL HAVE A MAX. AGGREGATE SIZE OF 3/4"

FOOTINGS AND SLABS:

- ALL FOOTINGS AND SLABS HAVE BEEN DESIGNED BASED ON AN ASSUMED SOIL BEARING CAPACITY OF 2,500 P.S.F. A GEOTECHNICAL REPORT SHALL BE SUBMITTED TO ARCHITECT FOR REVIEW AND CONFIRMATION OF ASSUMED DESIGN BEARING PRESSURE. SUCH GEOTECHNICAL REPORT SHALL BE SUBMITTED AND APPROVED BY ARCHITECT PRIOR TO PLACEMENT OF FOOTINGS.
- ALL ORGANIC MATERIAL BENEATH FOOTINGS AND SLABS SHALL BE REMOVED PER RECOMMENDATION OF GEOTECHNICAL REPORT.
- FOOTINGS AND SLABS SHALL BEAR ON CLEAN WELL COMPACTED FILL WHICH SHALL EXTEND A MIN. DISTANCE OF 5' BEYOND THE OUTERMOST EDGE.
- HORIZONTAL PENETRATIONS THROUGH FOOTINGS SHALL NOT BE PERMITTED
- MIN. 6 MIL VAPOR BARRIER SHALL BE PLACED BELOW ALL SLABS ON GRADE.
- VERTICAL PENETRATIONS THROUGH SLABS SHALL BE FULLY SEALED BY SECURING EDGE OF VAPOR BARRIER TO PENETRATION W/ APPROVED ADHESIVE TAPE.
- W.W.M. SHALL BE INSTALLED W/ 2" STAND OFF SEATS.



2 / S-1 NEW TO OLD FTG. DET.
N.T.S.



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

NOTE: ONLY NEW FOOTING SHOWN, ALL EXISTING FOOTINGS SHALL REMAIN WITHOUT ANY CHANGE UNDER THIS PERMIT.

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL 33316
OFFICE: (954) 523-2685 ALEX KHOURY – AR91487 FAX: (954) 764-8333
DESIGN / BUILD

PROJECT: Proposed Renovation For:
Mr. & Mrs. Chris & Jen Trapani
9411 Live Oak Pl. #102
Davie, FL 33324
PROJECT NO.: R-23-TR01

DWG. TITLE: Structural

THE ARCHITECT HEREBY PRESERVES COPYRIGHT OF ALL DESIGNS & CONCEPTS CONTAINED IN THIS DRAWING. THIS CONTENT SHALL NOT BE COPIED, REPRODUCED OR USED FOR ANY WORKS WITHOUT THE EXPRESS WRITTEN CONSENT

REVISIONS:

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

DWG. BY: T.A.K.

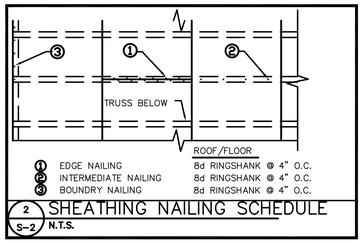
DRAWING No.: S-1 OF 7

SEAL

2024-00006024

Approved
9/3/2024
Raymond Wright
Structural

Plans reviewed and approved by the AHJ shall not relieve the applicant of the responsibility of compliance with the current Florida Building Code.



2 S-2 SHEATHING NAILING SCHEDULE
N.T.S.

LABEL	SIZE	ELEV.	REINFORCEMENT			STIRRUP SPACING			REMARKS
			TOP	MID.	BOTT.	SIZE	❁ OPENING	❁ WALL	
TB-1	EXIST								EXISTING TO REMAIN
WH1	6"x5.5"	AS SHWN.	–	–	–	–	–	–	(4) – 2"x6"

DENOTES BEAM ABOVE OPENING.

TOP ELEVATION OF BEAM OFF FINISH FLOOR. BM TB-1 EL

BOTT. CHORD LEDGEND

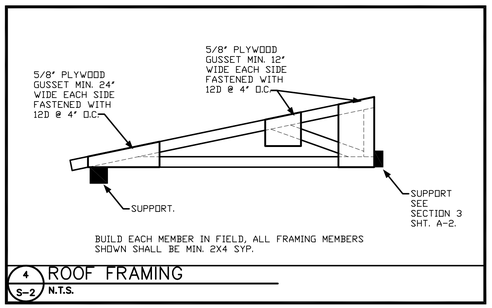
BOTTOM CHORD @ +8'-0" A.F.F.

ALL OVERHANGS TO BE 1'-0" U.O.N.

ALL ROOF PITCHES TO BE 3:12 U.O.N.

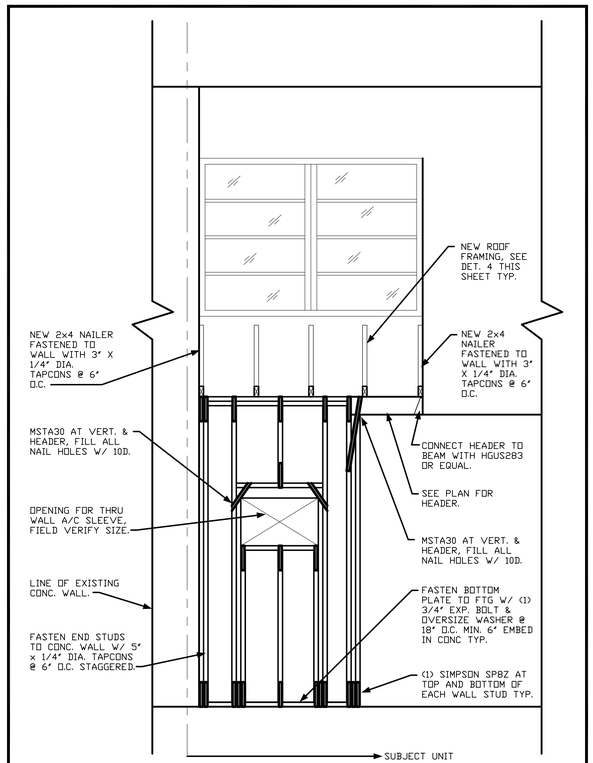
MAX. SPACING FOR ALL FRAMING MEMBERS SHALL NOT EXCEED 24" O.C. U.O.N.

ATTIC VENTING SHALL BE CALCULATED @ 1 SQ. IN. PER 150 SQ. FT. OF ATTIC AREA

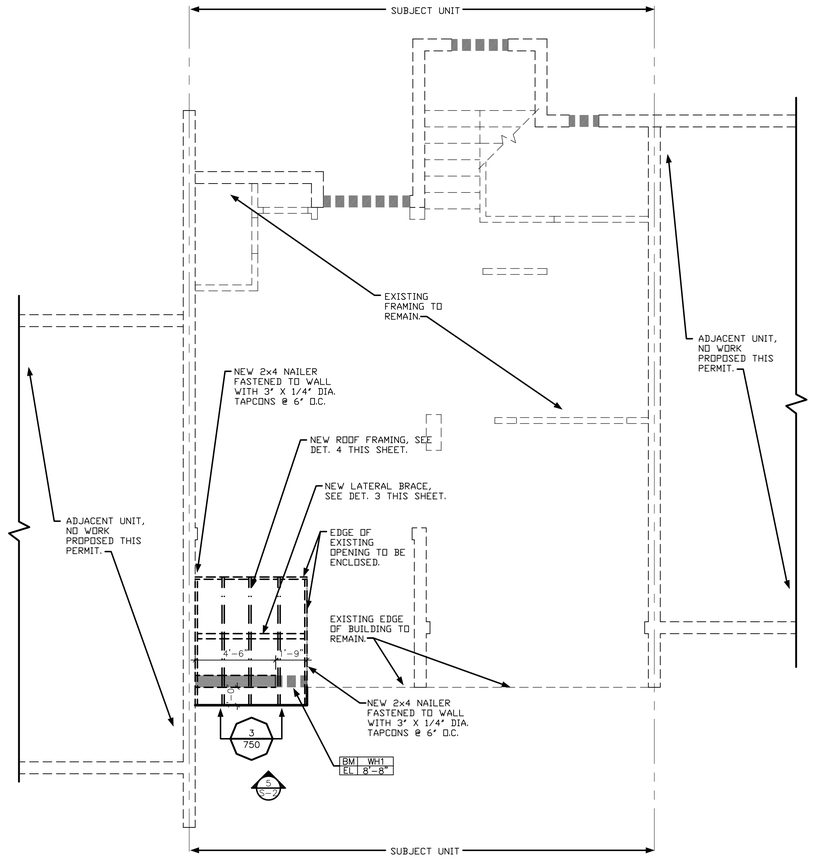


4 S-2 ROOF FRAMING
N.T.S.

3 S-2 LATERAL BRACING
N.T.S.



5 S-2 WALL FRAMING DETAIL
N.T.S.



1 S-2 ROOF FRAMING PLAN
1/4" = 1'-0"

WIND LOAD DESIGN CRITERIA:

– SUCH STRUCTURE LIES IN A "HIGH VELOCITY HURRICANE ZONE" AND ONLY THE NEW COMPONENTS HAVE BEEN DESIGNED BASED ON CRITERIA AS SET FORTH IN CHAPTERS 44 FLORIDA BUILDING CODE RESIDENTIAL ed. 2023

– SUCH STRUCTURE IS RISK CATEGORY II

– THE NEW COMPONENTS OF THIS STRUCTURE, SITUATED IN BROWARD COUNTY, HAVE BEEN DESIGNED FOR AN ULTIMATE WIND SPEED OF 170 mph. @ 3 SECOND GUSTS BASED ON ASCE7-16

CONN. NO. 1 UPLIFT 245 # NO. OF CONN.

CONNECTOR SCHEDULE

FAST. NO.	FASTNER MNFCTR	FASTNER DESCRIPTION	UPLIFT	CONNECTION TO STRUCTURE	CONNECTION TO TRUSS
1	SIMPSON	HETA24	1,810	EMBED	(9)–10dx1–1/2"
2	SIMPSON	(2) x HETA24	3,230	EMBED	(9)–10dx1–1/2" / ANCHOR
3	SIMPSON	MTS30C	1,000	(10)–10dx1–1/2"	(10)–10dx1–1/2"
4					

NOTE: ALL CONNECTORS SPECIFIED MAY BE REPLACED W/ EQUAL

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL 33316
OFFICE: (954) 523-2685 ALEX KHOURY – AR91487 FAX: (954) 764-8333
DESIGN / BUILD

PROJECT: Proposed Renovation For: Mr. & Mrs. Chris & Jen Trapani
PROJECT NO.: R-23-TR01
9411 Live Oak Pl. #102 Davie, Fl. 33324

DWG. TITLE: Structural

THE ARCHITECT HEREBY PRESERVES COMMON LAW COPYRIGHT AND OTHER PROPERTY RIGHTS IN THE DESIGNS AND PLANS SHOWN HEREON. ALL DESIGNS AND PLANS SHOWN HEREON ARE NOT TO BE USED IN WHOLE OR IN PART FOR ANY OTHER PROJECT WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ARCHITECT. THIS DRAWING AND ITS CONTENT SHALL NOT BE COPIED, REPRODUCED OR ALTERED IN ANY FORM OR MANNER WHATSOEVER. ALL RIGHTS RESERVED. UNAUTHORIZED USE OF THESE PLANS AND UNPERMITTED CONSTRUCTION WORKS WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ARCHITECT.

REVISIONS:

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

DWG. BY: T.A.K.

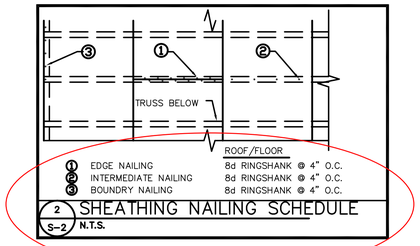
DRAWING No.: S-2 OF 7

SEAL

2024-00006024

Approved
9/3/2024
Raymond Wright
Structural

Plans reviewed and approved by the AHJ shall not relieve the applicant of the responsibility of compliance with the current Florida Building Code.



2 S-2 SHEATHING NAILING SCHEDULE
N.T.S.

LABEL	SIZE	ELEV.	REINFORCEMENT			STIRRUP SPACING			REMARKS
			TOP	MID.	BOTT.	SIZE	❁ OPENING	❁ WALL	
TB-1	EXIST								EXISTING TO REMAIN
WH1	6"x5.5"	AS SHWN.	–	–	–	–	–	–	(4) – 2"x6"

DENOTES BEAM ABOVE OPENING.

TOP ELEVATION OF BEAM OFF FINISH FLOOR. BM TB-1 EL ----

BOTT. CHORD LEDGEND

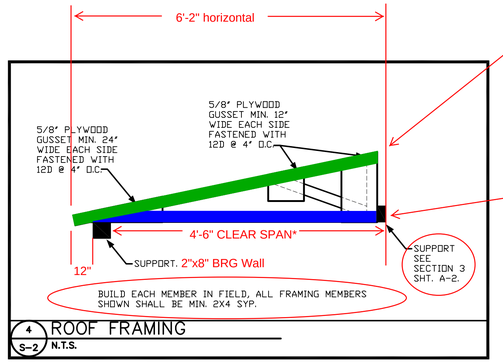
BOTTOM CHORD @ +8'-0" A.F.F.

ALL OVERHANGS TO BE 1'-0" U.O.N.

ALL ROOF PITCHES TO BE 3:12 U.O.N.

MAX. SPACING FOR ALL FRAMING MEMBERS SHALL NOT EXCEED 24" O.C. U.O.N.

ATTIC VENTING SHALL BE CALCULATED @ 1 SQ. IN. PER 150 SQ. FT. OF ATTIC AREA



4 S-2 ROOF FRAMING
N.T.S.

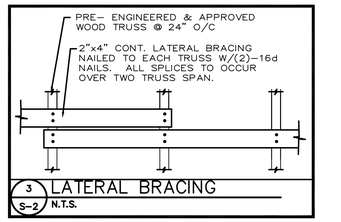
* CLEAR SPAN PER DEFINITION IN AWC.

Rafter not supporting ceiling in green.

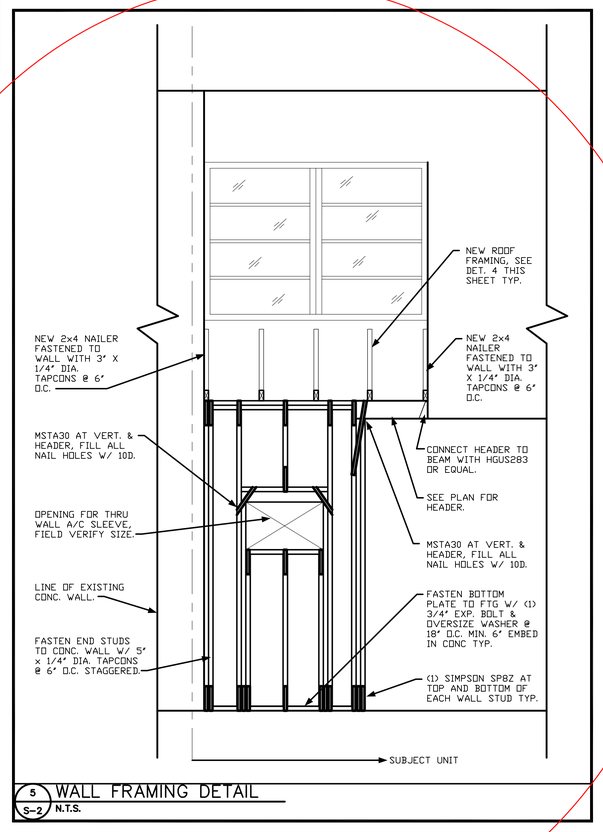
A single 2x4 SP as specified is adequate per AWC STJR Table R-19. Stated differently, this single 2x4 member (by itself and without other support or additional framing members) can exist on its own and meet the plain wording of all applicable sections of FBC-B 2023.

Ceiling joist supporting only drywall in blue.

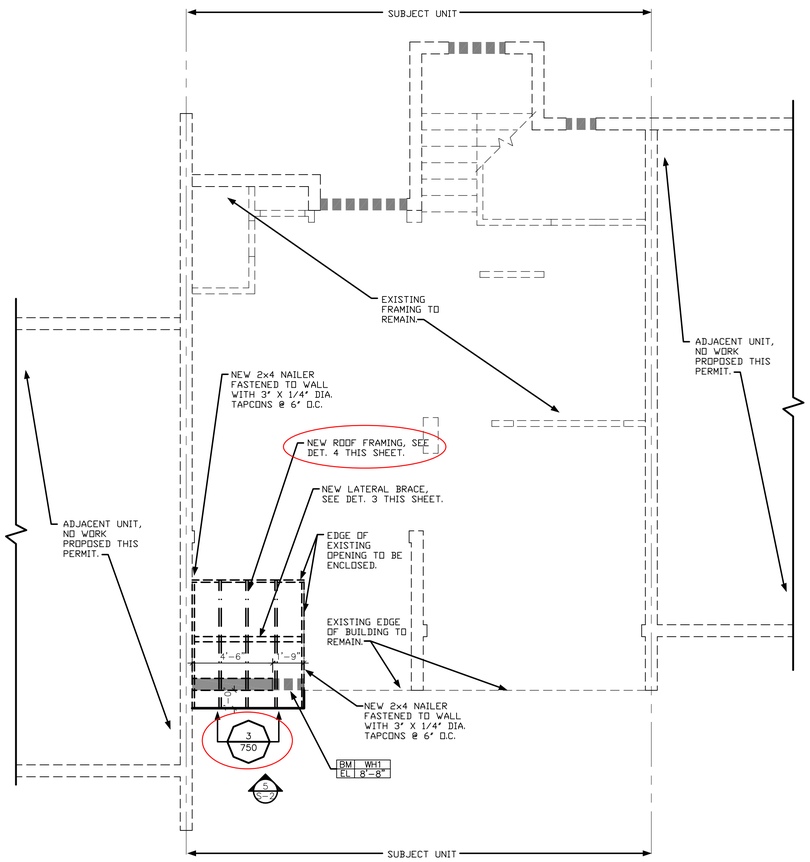
A single 2x4 SP as specified is adequate per AWC STJR Table C-1. Stated differently, this single 2x4 member (by itself and without other support or additional framing members) can exist on its own and meet the plain wording of all applicable sections of FBC-B 2023.



3 S-2 LATERAL BRACING
N.T.S.



5 S-2 WALL FRAMING DETAIL
N.T.S.



1 S-2 ROOF FRAMING PLAN
1/4" = 1'-0"

CONN. NO. 1 UPLIFT 245 # NO. OF CONN.

CONNECTOR SCHEDULE

FAST. NO.	FASTNER MNFCTR	FASTNER DESCRIPTION	UPLIFT	CONNECTION TO STRUCTURE	CONNECTION TO TRUSS
1	SIMPSON	HETA24	1,810	EMBED	(9)-10dx1-1/2"
2	SIMPSON	(2) x HETA24	3,230	EMBED	(9)-10dx1-1/2" / ANCHOR
3	SIMPSON	MTS30C	1,000	(10)-10dx1-1/2"	(10)-10dx1-1/2"
4					

NOTE: ALL CONNECTORS SPECIFIED MAY BE REPLACED W/ EQUAL

WIND LOAD DESIGN CRITERIA:

– SUCH STRUCTURE LIES IN A "HIGH VELOCITY HURRICANE ZONE" AND ONLY THE NEW COMPONENTS HAVE BEEN DESIGNED BASED ON CRITERIA AS SET FORTH IN CHAPTERS 44 FLORIDA BUILDING CODE RESIDENTIAL ed. 2023

– SUCH STRUCTURE IS RISK CATEGORY II

– THE NEW COMPONENTS OF THIS STRUCTURE, SITUATED IN BROWARD COUNTY, HAVE BEEN DESIGNED FOR AN ULTIMATE WIND SPEED OF 170 mph. @ 3 SECOND GUSTS BASED ON ASCE7-16

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL 33316
ALEX KHOURY – AR91487
OFFICE: (954) 523-2685 FAX: (954) 764-8333
DESIGN / BUILD

PROJECT: Proposed Renovation For: Mr. & Mrs. Chris & Jen Trapani
PROJECT NO.: R-23-TR01
9411 Live Oak Pl. #102 Davie, Fl. 33324

DWG. TITLE: Structural

THE ARCHITECT HEREBY PRESERVES COMMON LAW COPYRIGHT AND OTHER PROPERTY RIGHTS IN THE DESIGNS, IDEAS, PLANS AND CONTENT SHALL NOT BE COPIED, REPRODUCED OR USED IN ANY WAY WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ARCHITECT

REVISIONS:

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

DWG. BY: T.A.K.

DRAWING No.: S-2 OF 7

SEAL

DENOTES EXISTING CIRCUIT TO REMAIN IN EXISTING PANEL.

PANEL "A" EXISTING

120/240 V
1 PHASE 3 WIRE

24 CIRCUITS
125 A.

CT#	DESCRIPTION	LOAD	WIRE	C/B TP.	CT#	DESCRIPTION	LOAD	WIRE	C/B TP.
1,3	AC COMP	N.C.		2P–40	2,4	A.H.U.	7,000		2P–40
5	SM APP	1,500		1P–20	6	KIT GFI	1,500		1P–20
7	DISHWASHER	1,200		1P–20	8	GEN LIGHT/REC	–		1P–15
9	GEN. LIGHT	–		1P–15	10	GEN LIGHT/REC	–		1P–15
11	KIT GFI	1,500		1P–20	12	KIT LIGHTS	–		1P–15
13	FRIDGE	1,200		1P–20	14	GEN LIGHTS	–		1P–15
15	WASHER	1,500		1P–20	16,18	RANGE	8,000		2P–50
17,19	WATER HEATER	3,500		2P–20					
					20	General Light (AFCI)	–	#14	1P–15
21,23	DRYER	5,000		2P–30	22	AC Unit (AFCI)	900	#14	1P–15
					24				

PANEL SUB–TOTAL (LESS A.H.U.)	24,900 W.	FIRST 10,000 W @ 100%	10,000 W.
		REMAINDER @ 40%	7,568 W.
GENERAL LIGHTING LOAD 3W/SF	4,020 W.	A.H.U. @ 100%	7,900 W.
(0)–CEILING FANS (200 W. EACH)	0 W.	TOTAL = 25,468 W. / 240 = 107 A.	
TOTAL LOAD (LESS A.H.U.)	28,920 W.		

NOTE:

– All existing electrical components shall remain, no work to existing building electric service entrance, meter and main disconnect.

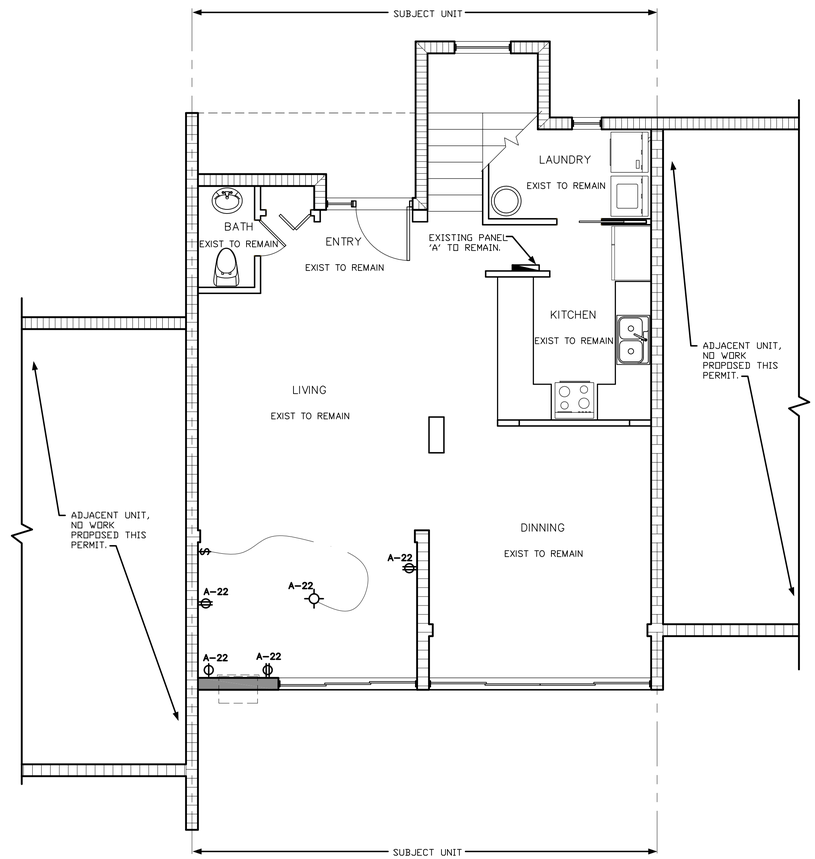
– All new electrical devices and wiring shall comply with NEC 2017

– Only new electrical devices shown.

– All new 120–volt, single phase, 15– and 20–ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc–fault circuit interrupter, combination–type, installed to provide protection of the branch circuit.

ELECTRICAL LEGEND.

- 120 V. WALL MOUNTED DUPLEX RECEPTACLE
- 120 V. WALL MOUNTED SINGLE POLE RECEPTACLE
- 120 V. WALL MOUNTED DUPLEX RECEPTACLE (1 LEG SWITCHED)
- 120 V. WALL MOUNTED DUPLEX RECEPTACLE (WATER PROOF GFI)
- 120 V. WALL MOUNTED DUPLEX RECEPTACLE (GROUND FAULT INTERCEPT)
- SINGLE POLE SWITCH
- THREE WAY SWITCH
- CEILING MOUNTED LIGHT FIXTURE
- HIGH HAT LIGHT
- TELEVISION CABLE JACK
- TELEPHONE JACK
- ELECTRICAL PANEL
- DISCONNECT
- WALL MOUNTED LIGHT FIXTURE



1 E–1 ELEC. PLAN
1/4" = 1'–0"

Artistic Design & Contracting
3233 S. ANDREWS AVE., FT. LAUDERDALE, FL 33316
OFFICE: (954) 523–2685 ALEX KHOURY – AR91487 DESIGN / BUILD (954) 764–8333 FAX:

DWG. TITLE: Electric Floor Plan

THE ARCHITECT HEREBY PRESERVES, COMMON LAW COPYRIGHT & ASSERTS OWNERSHIP OF ALL DESIGNS & CONCEPTS REPRESENTED IN THIS PLAN. SUCH CONTENT SHALL NOT BE COPIED, REPRODUCED, OR USED IN DERIVATIVE WORKS WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ARCHITECT.

PROJECT: Proposed Renovation For:
Mr. & Mrs. Chris & Jen Trapani
9411 Live Oak Pl. #102
Davie, Fl. 33324

PROJECT NO.: R–23–TR01

REVISIONS:

DWG. SCALE : 1/4" = 1'–0"

DATE:

2024-0006024

Approved
7/25/2024
James Brower
Electrical

Plans reviewed and approved by the AHJ shall not relieve the applicant of the responsibility of compliance with the current Florida Building Code.

Town of Davie Permits

Powered by Tyler Technologies

Permit Summary

Permit Type	S-Residential Alteration
Permit #	2024-00006024
Application #	2024-00006024
Status	**Permit Issued on 10/24/2024**
Issued To	Contractor

Payment Summary

Total Charges	$474.82
Amount Collected	$474.82
Total Due	$0.00
Paid On	05/22/2025

Location

Primary Owner	TRAPANI, CHRISTOPHER M &JENNIFER
Address	9411 LIVE OAK PL 102 DAVIE FL, 33324
Parcel	504117DJ0020
Location Description	
Lot Number	
Subdivision	Live Oak Place

Permit Details

Description
Renovation Of Town Home

Email	alex@ultradesignbuild.com
Phone Number	(954) 444-7366
EXT.	
Current Property Value	
Est. Improvement Value	$19,000.00
Improvement Sq. Ft.	1,340
Printed	
Master Permit	
Comments	Contractor Ultra Structures 954-444-7366 Owner Chris Trapani 954-530-6957

Inspections

REQUEST

Date	Inspection Type	Request Inspection Comment	Status	Pass/Fail	Inspector Comment
03/19/2025	S1050 Door & Window Buck	Add Comment	Completed	Pass	
05/15/2025	S1055 Door Install	Add Comment	Completed	Pass	

04/02/2025	S1065 Drywall Screw	Add Comment	Completed	Pass
11/12/2024	S1115 Footing	Add Comment	Completed	Pass
03/19/2025	S1130 Framing	Add Comment	Completed	Pass
03/19/2025	S1135 Framing Exterior	Add Comment	Completed	Pass
04/02/2025	S1145 Insulation - Ceiling	Add Comment	Completed	Pass
04/02/2025	S1150 Insulation - Wall	Add Comment	Completed	Pass
04/02/2025	S1155 Lath	Add Comment	Completed	Pass
11/26/2024	S1225 Roof Sheathing	Add Comment	Completed	Pass
11/26/2024	S1230 Roof Truss Anchor	Add Comment	Completed	Pass
11/26/2024	S1235 Roof Truss Engineering	Add Comment	Completed	Pass
11/12/2024	S1270 Slab Form	Add Comment	Completed	Pass
11/26/2024	S1360 Wall Sheathing	Add Comment	Completed	Pass
05/15/2025	S1340 Weather Barrier	Add Comment	Completed	Pass
05/15/2025	S1310 Structural Final	Add Comment	Completed	Pass

Conditions

Active	Code	Comment	Due Date
✓	Non Applicable - Mechanical Dept	Date: 7/29/24 Non-Applicable By: Allen G	
✓	Prescreen Rejected	Date: 7.16.24 Comments: See Project Dox.	
✓	Location of Plans	Date: 7.23.24 Permit routed to Elec, Mech, Plb & Struct Dept.	08/15/2024
✓	Approved Electrical Dept	Date: 03/12/25 Approved by James B	
✓	Approved Electrical Dept	Date: 7-25-24 Approved by James B	

✓	Project Dox Submittal	Date: 7/11/24 The application was created and uploaded in projectdox. Pending files to be uploaded from the applicant. Emailed alex@ultradesignbuild.com
✓	Non Applicable - Plumbing Dept	Date: 7/23/24 Non-Applicable. By: P PEDERSEN
✓	Permit Ready to be Issued	Date: 9/23/24 Permit ready to be issued. Balance due $414.82 Emailed Customer at alex@ultradesignbuild.com BATCH STAMP need to update License
✓	Approved Structural Dept	Date: 9/9/24 Approved by Ray W

Notes

Subject	Note	Date
CC	The Certificate of completion has been rejected due to the following: 1- A Truss shop drawing from a certified truss company must be submitted for review. 2- A sub-roofing permit is required according to the alteration scope of work. A roofing permit will not be issued until the truss shop drawing is submitted for review and approved.	05/25/25
Electrical	Approved app	03/12/25
STR Approved	approved	09/09/24
electric	Approved to sub hub/p dox. Need electrical app. rough, final	07/25/24
NA P 24-6024	NO PLUMBING WORK SHOWN ON PLANS	07/23/24

© 2025 Town of Davie

Town of Davie Permits

Powered by Tyler Technologies

Welcome Page Public Search

Permit Summary

Permit Type	S-Residential Alteration
Permit #	2024-00006024
Application #	2024-00006024
Status	**Permit Issued on 10/24/2024**
Issued To	Contractor

Payment Summary

Total Charges	$474.82
Amount Collected	$474.82
Total Due	$0.00
Paid On	05/22/2025

Location

Primary Owner	TRAPANI, CHRISTOPHER M &JENNIFER
Address	9411 LIVE OAK PL 102 DAVIE FL, 33324
Parcel	504117DJ0020
Location Description	
Lot Number	
Subdivision	Live Oak Place

Permit Details

Description
Renovation Of Town Home

Email	alex@ultradesignbuild.com
Phone Number	(954) 444-7366
EXT.	
Current Property Value	
Est. Improvement Value	$19,000.00
Improvement Sq. Ft.	1,340
Printed	
Master Permit	
Comments	Contractor Ultra Structures 954-444-7366 Owner Chris Trapani 954-530-6957

Inspections

REQUEST

Date	Inspection Type	Request Inspection Comment	Status	Pass/Fail	Inspector Comment
	S1225 Roof Sheathing		Available to Request		
	S1230 Roof Truss Anchor		Available to Request		

	S1235 Roof Truss Engineering		Available to Request	
	S1310 Structural Final		Available to Request	
03/19/2025	S1050 Door & Window Buck	Add Comment	Completed	Pass
05/15/2025	S1055 Door Install	Add Comment	Completed	Pass
04/02/2025	S1065 Drywall Screw	Add Comment	Completed	Pass
11/12/2024	S1115 Footing	Add Comment	Completed	Pass
03/19/2025	S1130 Framing	Add Comment	Completed	Pass
03/19/2025	S1135 Framing Exterior	Add Comment	Completed	Pass
04/02/2025	S1145 Insulation - Ceiling	Add Comment	Completed	Pass
04/02/2025	S1150 Insulation - Wall	Add Comment	Completed	Pass
04/02/2025	S1155 Lath	Add Comment	Completed	Pass
11/26/2024	S1225 Roof Sheathing	Add Comment	Completed	Fail
11/26/2024	S1230 Roof Truss Anchor	Add Comment	Completed	Fail
11/26/2024	S1235 Roof Truss Engineering	Add Comment	Completed	Fail
11/12/2024	S1270 Slab Form	Add Comment	Completed	Pass
11/26/2024	S1360 Wall Sheathing	Add Comment	Completed	Pass
05/15/2025	S1340 Weather Barrier	Add Comment	Completed	Pass
05/15/2025	S1310 Structural Final	Add Comment	Completed	Fail

Conditions

Active	Code	Comment	Due Date
✓	Non Applicable - Mechanical Dept	Date: 7/29/24 Non-Applicable By: Allen G	
✓	Prescreen Rejected	Date: 7.16.24 Comments: See Project Dox.	
✓	Location of Plans	Date: 7.23.24 Permit routed to Elec, Mech, Plb & Struct Dept.	08/15/2024
✓	Approved Electrical Dept	Date: 03/12/25 Approved by James B	
✓	Approved Electrical Dept	Date: 7-25-24 Approved by James B	
✓	Project Dox Submittal	Date: 7/11/24 The application was created and uploaded in projectdox. Pending files to be uploaded from the applicant. Emailed alex@ultradesignbuild.com	
✓	Non Applicable - Plumbing Dept	Date: 7/23/24 Non-Applicable. By: P PEDERSEN	
✓	Permit Ready to be Issued	Date: 9/23/24 Permit ready to be issued. Balance due $414.82 Emailed Customer at alex@ultradesignbuild.com BATCH STAMP need to update License	
✓	Approved Structural Dept	Date: 9/9/24 Approved by Ray W	

Notes

Subject	Note	Date
CC	The Certificate of completion has been rejected due to the following: 1- A Truss shop drawing from a certified truss company must be submitted for review. 2- A sub-roofing permit is required according to the alteration scope of work. A roofing permit will not be issued until the truss shop drawing is submitted for review and approved.	05/25/25
Electrical	Approved app	03/12/25
STR Approved	approved	09/09/24
electric	Approved to sub hub/p dox. Need electrical app. rough, final	07/25/24
NA P 24-6024	NO PLUMBING WORK SHOWN ON PLANS	07/23/24

© 2025 Town of Davie

Town of Davie Permits

Powered by Tyler Technologies

Welcome Page Public Search

Permit Summary

Permit Type	S-Residential Alteration
Permit #	2024-00006024
Application #	2024-00006024
Address	9411 LIVE OAK PL 102 DAVIE, FL 33324
Status	**Permit Issued on 10/24/2024**
Issued To	Contractor

Inspection Details

Inspection	- 2024-00026837
Inspection Status	Completed 11/26/2024
Inspection Results	Fail
Inspector	Mitch Lipton
Actual Inspection Date	11/26/2024 10:30 AM
Comments	06/21/2025 The inspection pass status has been revoked by the building official, William Diaz, due to the following: FBC Building 2023, 8 Edition, Section 2319.10 Roof framing. The permit documents shall include roof framing plans showing spacing and spans of all roof members indicating any fabricated elements to be designed and furnished by others and shall include the details for support and bearing of the roof structural system, for the permanent cross/lateral/diagonal bracing and anchorage required to resist dead, live and wind loads as

Roof Sheathing Inspection

	set forth in Chapter 16 (High-Velocity Hurricane Zones). The framing plans shall also indicate the uplift forces applied on the roof, sheathing type, thickness and nailing requirements for the sheathing. The roof framing plans shall be prepared by, and bear the sign and seal of, a registered professional engineer or registered architect of record proficient in structural design. FBC Building 2023, 8 Edition, Chapter 23, Section 2303.4, 2303.1.1.

© 2025 Town of Davie

Town of Davie Permits

Powered by Tyler Technologies

Welcome Page Public Search

Permit Summary

Permit Type	S-Residential Alteration
Permit #	2024-00006024
Application #	2024-00006024
Address	9411 LIVE OAK PL 102 DAVIE, FL 33324
Status	**Permit Issued on 10/24/2024**
Issued To	Contractor

Inspection Details

Inspection	- 2024-00026840
Inspection Status	Completed 11/26/2024
Inspection Results	Fail
Inspector	Mitch Lipton
Actual Inspection Date	11/26/2024 10:30 AM
Comments	06/21/2025 The inspection pass status has been revoked by the building official, William Diaz, due to the following: FBC Building 2023, 8 Edition, Section 2319.10 Roof framing. The permit documents shall include roof framing plans showing spacing and spans of all roof members indicating any fabricated elements to be designed and furnished by others and shall include the details for support and bearing of the roof structural system, for the permanent cross/lateral/diagonal bracing and anchorage required to resist dead, live and wind loads as

Roof Truss Engineering Inspection

	set forth in Chapter 16 (High-Velocity Hurricane Zones). The framing plans shall also indicate the uplift forces applied on the roof, sheathing type, thickness and nailing requirements for the sheathing. The roof framing plans shall be prepared by, and bear the sign and seal of, a registered professional engineer or registered architect of record proficient in structural design. FBC Building 2023, 8 Edition, Chapter 23, Section 2303.4, 2303.1.1.

© 2025 Town of Davie

Town of Davie Permits

Powered by Tyler Technologies

Welcome Page Public Search

Permit Summary

Permit Type	S-Residential Alteration
Permit #	2024-00006024
Application #	2024-00006024
Address	9411 LIVE OAK PL 102 DAVIE, FL 33324
Status	**Permit Issued on 10/24/2024**
Issued To	Contractor

Inspection Details

Roof Truss Anchor Inspection

Inspection	- 2024-00026839
Inspection Status	Completed 11/26/2024
Inspection Results	Fail
Inspector	Mitch Lipton
Actual Inspection Date	11/26/2024 10:30 AM
Comments	06/21/2025 The inspection pass status has been revoked by the building official, William Diaz, due to the following: FBC Building 2023, 8 Edition, Section 2319.10 Roof framing. The permit documents shall include roof framing plans showing spacing and spans of all roof members indicating any fabricated elements to be designed and furnished by others and shall include the details for support and bearing of the roof structural system, for the permanent cross/lateral/diagonal bracing and anchorage required to resist dead, live and wind loads as

	set forth in Chapter 16 (High-Velocity Hurricane Zones). The framing plans shall also indicate the uplift forces applied on the roof, sheathing type, thickness and nailing requirements for the sheathing. The roof framing plans shall be prepared by, and bear the sign and seal of, a registered professional engineer or registered architect of record proficient in structural design. FBC Building 2023, 8 Edition, Chapter 23, Section 2303.4, 2303.1.1.

© 2025 Town of Davie

Town of Davie Permits

Powered by Tyler Technologies

Welcome Page Public Search

Permit Summary

Permit Type	S-Residential Alteration
Permit #	**2024-00006024**
Application #	**2024-00006024**
Address	9411 LIVE OAK PL 102 DAVIE, FL 33324
Status	**Permit Issued on 10/24/2024**
Issued To	Contractor

Inspection Details

Structural Final Inspection

Inspection	- 2025-00008975
Inspection Status	Completed 05/15/2025
Inspection Results	Fail
Inspector	Raymond Wright
Actual Inspection Date	5/15/2025 9:30 AM
Comments	06/21/2025 The inspection pass status has been revoked by the building official, William Diaz, due to the following: FBC Building 2023, 8 Edition, Section 2319.10 Roof framing. The permit documents shall include roof framing plans showing spacing and spans of all roof members indicating any fabricated elements to be designed and furnished by others and shall include the details for support and bearing of the roof structural system, for the permanent cross/lateral/diagonal bracing and anchorage required to resist dead, live and wind loads as set forth in Chapter 16 (High-Velocity Hurricane Zones). The framing plans shall also indicate

	the uplift forces applied on the roof, sheathing type, thickness and nailing requirements for the sheathing. The roof framing plans shall be prepared by, and bear the sign and seal of, a registered professional engineer or registered architect of record proficient in structural design. FBC Building 2023, 8 Edition, Chapter 23, Section 2303.4, 2303.4.1.1. FBC Building 2023, 8 Edition, Chapter 1, Section 105.1 Roof installation without permit.

© 2025 Town of Davie

Plan Review - Review Comments Report

Project Name: **2024-00006024**
Workflow Started: **5/21/2025 9:41:36 AM**
Report Generated: **06/17/2025 07:40 AM**

REVIEW COMMENTS

REF #	CYCLE	REVIEWED BY	TYPE	FILENAME	DISCUSSION	STATUS
1	1	Building Official William Diaz 5/25/25 9:17 PM	Comment The Certificate of completion has been rejected due to the following: 1- A Truss shop drawing from a certified truss company must be submitted for review. 2- A sub-roofing permit is required according to the alteration scope of work. A roofing permit will not be issued until the truss shop drawing is submitted for review and approved.			Unresolved

Plan Review - Review Comments Report

Project Name: **2024-00006024**
Workflow Started: **5/21/2025 9:41:36 AM**
Report Generated: **06/17/2025 07:40 AM**

REVIEW COMMENTS

REF #	CYCLE	REVIEWED BY	TYPE	FILENAME	DISCUSSION	STATUS
1	1	Building Official William Diaz 5/25/25 9:17 PM	Comment The Certificate of completion has been rejected due to the following: 1- A Truss shop drawing from a certified truss company must be submitted for review. 2- A sub-roofing permit is required according to the alteration scope of work. A roofing permit will not be issued until the truss shop drawing is submitted for review and approved.			Unresolved

July 25, 2025

Mr. Jack Morell and Mr. Michael Guerasio
Chief Structural Code Compliance Officers
Broward County Board of Rules and Appeals

RE: Structural Peer Review for
Proposed Renovations for
Mr. & Mrs. Chris and Jen Trapani
9411 Live Oak Place #102
Davie, FL 33324

JSG# 25093

Dear Mr. Morell and Mr. Guerasio,

Mr. T. Alex Khoury, Architect, with Artistic Design & Contracting, Inc. has voluntarily asked Johnson Structural Group, Inc. (JSG) for a structural peer review of the above captioned project. This letter will introduce our qualifications to review the plans completed by Mr. Khoury, the structural scope of the project, and our recommendations.

Johnson Structural Group:
JSG is a well-known Commercial Structural Engineering firm based in Boca Raton, Florida. We have completed commercial designs for over 2,600 projects since our inception in 1998. In Davie alone, we have completed numerous shopping centers, hotels, completed miscellaneous projects for FAU Davie campus, a Publix store, and health care facilities. All our engineers have been with the company for over 20 years and have expertise in every construction system utilized in South Florida. The peer review was specifically completed by me, Mark Johnson PE, the company founder. I am a Florida Board Recognized Structural Engineer. I have served on the BCBORA Board as well as performed structural calculation review for residential structures on behalf of BCBORA in the past.

The Project Structural Scope and Presented Documents:
The Renovations for the Trapani family consist of reclaiming the exterior space created by a ground floor screened porch which occurs under a second-floor overhang. The second-floor overhang does not cover the whole rear face, so the architect had detailed a new wood framed closure end wall with a small hand framed pitched wood roof. The design is simplistic in nature and structural members utilized in the design do not require rational analysis.

Mr. Khoury has two structural sheets in the permitted documents, S-1 and S-2. These documents contain proper Florida Building Code edition references as well as the wind design. They also contain general structural notes, details of the new framed wall, connection schedules for the sheathing and framing, details for a hand framed roof member and a corresponding ceiling member to make the ceiling flat, and a new slab on grade with a turn down slab at the perimeter.

To perform the peer review, Mr. Khoury provided me with the design reference material, design load tables, and the Florida Building Code referenced standards he followed to complete the design and document the construction details. Everything Mr. Khoury provided for our review was current, part of the current Florida Building Code, or a code/standard referenced as part of the Florida Building Code. Mr. Khoury's use of the tables and selection of materials for the design are correct. The drawings presented reflect a proper design that meets the intent of the Florida Building Code.

160 West Camino Real, Suite 1000 ● Boca Raton, FL 33432
phone 561-982-8999 ● www.johnsonstructural.com

It is our understanding that there are some concerns that the drawings indicate pre-engineered wood trusses and that no shop drawings or details were provided during the construction. That concern is incorrect in that all the roof framing members are single 2x lumber hand framed in the field. This makes great sense as the roof area is very small and the span short. Hand framing this area is faster in the field and at less cost than ordering pre-engineered wood trusses. The main support is the sloped 2x4 at the top. He does add a single diagonal and a flat member to create a flat ceiling finish. The members are ganged together using nailed on plywood gussets. Because the American Wood Council standards referenced in the Florida Building Code demonstrate that sloped 2x4 roof members are sufficient by themselves to support the roof loads for the given span and spacing, the additional members only enhance the main 2x4s ability to carry the roof load from the existing wall to the new wood framed end wall.

Summary of Findings:
JSG has performed a thorough review of the plans and referenced load tables presented by Mr. Khoury. It is our professional opinion that the design, as presented and permitted, meets or exceeds the intent of the Florida Building Code, 2023 Edition. The roof framing members are constructed in the field and do not require truss shop drawings or engineering as they are not a prefabricated item. We do not see any inconsistencies, nor omissions that would hinder the construction of this project.

JOHNSON STRUCTURAL GROUP, INC.

Mark Johnson, PE# 51983

Digitally signed by Mark Johnson, PE# 51983
DN: CN="Mark Johnson, PE# 51983", E=mark@johnsonstructural.com, G=Mark, SN="Johnson, PE# 51983", C=US
Contact Info: Mark Johnson PE# 51983
Date: 2025.07.29 15:12:46-04'00'

Mark Johnson, P.E.
Florida PE# 51983
President

160 West Camino Real, Suite 1000 • Boca Raton, FL 33432
phone 561-982-8999 • www.johnsonstructural.com

Outlook

Re: Davie Permit 2024-6024 Clarification Regarding Roof Framing – Site-Built Assembly per Approved Drawings

From Alex Khoury <alexkhoury@outlook.com>
Date Thu 6/19/2025 12:58 PM
To pholste@davie-fl.gov <pholste@davie-fl.gov>; T Salim <office@ultradesignbuild.com>

2 attachments (419 KB)
Details for Permit 2024-6024.pdf; Permit 24-6024 CC Rejection Comments.pdf;

Philip,

As always, it was a pleasure speaking with you yesterday in follow up to this matter.

In addition to my 6/17/25 email which you have forwarded to the Town Attorney, kindly see additional information below which I respectfully submit for the Town Attorney's review regarding William Diaz's actions on permit 2024-6024. Kindly let me know after you forward this email to the Town Attorney for his review and consideration.

Please find attached to this email two (2) different printouts from the Town of Davie Building Department permitting system containing a comprehensive listing of details for permit 2024-6024. Kindly include these two (2) attachments when you forward this email to the Town Attorney for his ready reference.

To review this matter with the proper facts, please take note of the following listed in bullet point below.

- The signed and sealed plans were submitted for review and a permit to affect the work in accordance with such reviewed plans was issued from the Town of Davie Building Department on 10/24/2024.
- The signed / sealed and permitted plans specify details for the roof framing which include detail 4 found at sheet S-2 containing the text "BUILD EACH MEMBER IN FIELD". The construction industry distinguishes 'members built in field' from 'premanufactured trusses' each of which are disparate but equally acceptable roof framing methods.
- The roof framing, which was 'built in field' in accordance with the approved permitted plans, passed inspection on 11/26/24.
- Final building inspection passed on 5/15/25
- After completion of all permitted work, William Diaz rejected the issuance of a Certificate of Completion (CC) on 5/25/25 citing a request for submission of premanufactured truss shop drawings – this was the first time such a request was made throughout the entirety of the permitting process.
- 'Premanufactured truss' roof framing is a substantive change to the approved permitted signed/sealed plans which clearly specify a different roof framing that is 'built in field'.
- Only the original licensee has the legal authority to make substantive changes to a signed and sealed document. William Diaz is not the original licensee on the drawings and therefore has no legal authority to make substantive changes to same.

- As the Chief Building Official at the Town of Davie, Willaim Diaz is subject to compliance with Florida Statute 553.79 which reads in pertinent parts as follows:
    - 553.79 (2) (a) 1 "If the local building code administrator or inspector finds that the plans are not in compliance with the Florida Building Code, the local building code administrator or inspector shall identify the specific plan features that do not comply with the applicable codes, identify the specific code chapters and sections upon which the finding is based, and provide this information to the local enforcing agency."
    - 553.79 (b) (b) "After the local enforcing agency issues a permit, the local enforcing agency may not make or require any substantive changes to the plans or specifications except changes required for compliance with the Florida Building Code, the Florida Fire Prevention Code, or the Life Safety Code, or local amendments thereto. If a local enforcing agency makes or requires substantive changes to the plans or specifications after a permit is issued, the local enforcing agency must identify the specific plan features that do not comply with the applicable codes, identify the specific code chapters and sections upon which the finding is based, and provide the information to the permitholder in writing."
    - 553.79 (4) (c) 2 "A building code administrator who fails to provide a permit applicant or permitholder with the reasons for making or requiring substantive changes to the plans or specifications is subject to disciplinary action against his or her certificate under s. 468.621(1)(i)."
- By requesting 'truss shop drawings' for roof framing that was previously permitted to be 'built in field', William has requested a substantive change after issuance of a permit. Therefore, based on a plain reading of the above cited statutes, William ***shall*** identify the specific plan features that do not comply with the applicable codes and he further ***shall*** identify the specific Florida Building Code chapters and sections upon which the substantive change is based.
- Please find attached to this email two (2) separate printouts from the Town of Davie Building Department permitting system for permit 2024-6024, both of which clearly fail to identify the specific plan features that do not comply with the applicable codes and also fail to identify the specific Florida Building Code chapters and sections upon which the substantive change is based. Accordingly, I submit that William's actions are currently in violation of the above listed sections of Florida statutes 553.79.
- To comply with the above listed statutes, William ***shall*** identify how the text "BUILD EACH MEMBER IN FIELD" (i.e. plan feature) fails to comply with Florida Building Code and William ***shall*** further cite the Florida Building Code which requires truss shop drawings for roof framing members which are 'built in field'. Until such time that William enters the foregoing into the Town of Davie Building Department permitting system, I submit that he remains in violation of the above cited sections of Florida Statute 553.79.
- Florida statute 553.791 states in pertinent parts.
    - 553.791 (14) (a) No more than 10 business days, or if the permit is related to single-family or two-family dwellings then no more than 2 business days, after receipt of a request for a certificate of occupancy or certificate of completion and the applicant's presentation of a certificate of compliance and approval of all other government approvals required by law, including the payment of all outstanding fees, the local building official shall issue the certificate of occupancy or certificate of completion or provide a notice to the applicant identifying the specific deficiencies, as well as the specific code chapters and sections.
    - 553.791 (14) (b) If the local building official does not provide notice of the deficiencies within the applicable time periods under paragraph (a), the request for a certificate of occupancy or certificate of completion is automatically granted and deemed issued as of the next business day. The local building official must provide the applicant with the written certificate of occupancy or certificate of completion within 10 days after it is automatically granted and issued. To resolve any identified deficiencies, the applicant may elect to dispute

the deficiencies pursuant to subsection (15) or to submit a corrected request for a certificate of occupancy or certificate of completion.

- As shown in the attached printouts from the Town of Davie Building Department permitting system, all government approvals have been satisfied and the request for a CC was submitted on 5/21/25. Because William rejected the CC on 5/25/25 without providing notice of deficiencies in accordance with the above listed sections of Florida Statute 553.79 and today is more than ten (10) days after receipt of request for a certificate of completion, I submit that a CC should be promptly issued.

Please note that, by failing to formally identify the specific plan features that do not comply with the applicable codes and further failing to formally identify the specific code chapters and sections upon which the finding is based according to 553.79, William has denied the public due process of allowing Broward County Board of Rules and Appeals review because there is not a properly written Building Official determination to review though its official appeals process.

I hereby make a formal request to know the nature of William Diaz's 'certificate' so that the Owner or I may exercise our statutory right to submit William's actions for disciplinary review under Florida statute 553.79 (4) (c) 2

Regards;

Alex Khoury
Architect
Ultra Structures, Inc.
Direct (954) 444-7366
Office (954) 523-2685
Fax (954) 764-8333

From: Alex Khoury <alexkhoury@outlook.com>
Sent: Tuesday, June 17, 2025 12:33 PM
To: pholste@davie-fl.gov <pholste@davie-fl.gov>; T Salim <office@ultradesignbuild.com>
Subject: Fw: Davie Permit 2024-6024 Clarification Regarding Roof Framing – Site-Built Assembly per Approved Drawings

Philip,

It was a pleasure speaking with you again.

Please see below email sent by an engineer to William Diaz on June 2 regarding the permit we discussed, and such email also included the attachments hereto. The attached plans are my signed and sealed drawings which also bear the approval stamp from the Town of Davie Building Department.

As discussed, my signed / sealed and permitted plans specifically state to "BUILD EACH MEMBER IN FIELD" and in fact the roof was framed on site in strict accordance with the permitted plans which bear *my* sign and seal. Despite the specific instructions in my signed and sealed plans, William has unilaterally decided that the roof is a 'premanufactured truss'. As I explained, a 'premanufactured truss' is mutually exclusive and disparate to 'field framing'; therefore, William has materially altered my signed and sealed plans by changing 'field framing' to a 'premanufactured truss'.

William has not provided any detailed response to the engineer's email nor has William provided any legal authority that permits him to alter *my* signed and sealed plans then demand compliance to such alteration. Because William's actions violate Florida statues governing Architects / Engineers, such actions far exceed the authority vested with the Building Official. As a proximate result, the Owner has been damaged by loosing use of a residence with a legally permitted addition.

Willaim is obligated to stay within the confines defined by permitted / signed and sealed plans, and I ask for your intervention to have William return to those lawful confines.

Regards;

Alex Khoury
Architect
Ultra Structures, Inc.
Direct (954) 444-7366
Office (954) 523-2685
Fax (954) 764-8333

From: eb cebb.net <eb@cebb.net>
Sent: Monday, June 2, 2025 10:24 AM
To: Wdiaz@davie-fl.gov <Wdiaz@davie-fl.gov>; Guerasio, Michael <mguerasio@broward.org>; Morell, John <jmorell@broward.org>
Cc: office@ultradesignbuild.com <office@ultradesignbuild.com>; Alex Khoury <alexkhoury@outlook.com>
Subject: Davie Permit 2024-6024 Clarification Regarding Roof Framing – Site-Built Assembly per Approved Drawings

Dear Mr. Diaz,

I hope this message finds you well.

Following a careful review of the approved permit drawings for the subject project, I respectfully submit the following professional observation for your consideration:

The structural roof framing details, particularly as illustrated on Sheet S-2, clearly depict a **site-built (hand-framed) roof system**. The drawings provide comprehensive construction-level information, including framing member sizing, gusset plate configurations, fastener schedules, and load path continuity. Nowhere do the documents indicate the use of pre-engineered or custom-fabricated wood roof trusses that would require separate truss shop drawings or third-party engineering submittals.

In my professional opinion, and based on the information included within the signed and sealed drawings by the Architect of Record—who remains in Responsible Charge—no additional shop drawings should be required. The permitted documents sufficiently demonstrate code compliance and provide the necessary construction directives for field-built roof framing.

Out of professional courtesy and respect for their experience and oversight within Broward County, I would like to also invite the two esteemed Chief Structural Code Compliance Officers of the Broward County Board of Rules and Appeals—**Mr. Michael Guerasio** and **Mr. John "Jack" Morrel**—to kindly review and provide their respective interpretations or guidance on the matter.

Should further clarification or supporting documentation be necessary, I remain at your disposal.

Sincerely Yours,

Eduard C. Badiu, PhD, P.E.
Lead Structures Specialist USAR FL-TF2
USDHS-FEMA

Florida
745 Shotgun Road
Fort Lauderdale, FL 33326
(954) 581-7115 Phone
(954) 581-2415 Fax
Indiana
1048 B Sagamore Parkway, #44
W. Lafayette, IN 47906
(765) 684-2315
Arizona
101 W Goodwin Str., Ste 103
P.O. Box 3171
Prescott, AZ 86302
(928) 488-5185

800 Line
(888) 364-3589

eb@cebb.net E-mail
www.CeBB.net

Licensed Engineer in AL, AR, AZ, CO, FL, GA, IA, IN, LA, MS, NC, NE, NY, OK, SC, TN , TX, USVI

This message is intended only for the use of the persons to whom it is addressed and may contain information which is privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, he/she is hereby notified that any dissemination, distribution or copying of this communication is illegal. Please notify Eduard C. Badiu and/or CeBB Engineering & Testing Co.. immediately by telephone, and destroy the original message.

Town of Davie Permits

Powered by Tyler Technologies

Permit Summary

Permit Type	S-Residential Alteration
Permit #	2024-00006024
Application #	2024-00006024
Status	**Permit Issued on 10/24/2024**
Issued To	Contractor

Payment Summary

Total Charges	$474.82
Amount Collected	$474.82
Total Due	$0.00
Paid On	05/22/2025

Location

Primary Owner	TRAPANI, CHRISTOPHER M &JENNIFER
Address	9411 LIVE OAK PL 102 DAVIE FL, 33324
Parcel	504117DJ0020
Location Description	
Lot Number	
Subdivision	Live Oak Place

Permit Details

Description
Renovation Of Town Home

Email	alex@ultradesignbuild.com
Phone Number	(954) 444-7366
EXT.	
Current Property Value	
Est. Improvement Value	$19,000.00
Improvement Sq. Ft.	1,340
Printed	
Master Permit	
Comments	Contractor Ultra Structures 954-444-7366 Owner Chris Trapani 954-530-6957

Inspections

REQUEST

Date	Inspection Type	Request Inspection Comment	Status	Pass/Fail	Inspector Comment
03/19/2025	S1050 Door & Window Buck	Add Comment	Completed	Pass	
05/15/2025	S1055 Door Install	Add Comment	Completed	Pass	

04/02/2025	S1065 Drywall Screw	Add Comment	Completed	Pass
11/12/2024	S1115 Footing	Add Comment	Completed	Pass
03/19/2025	S1130 Framing	Add Comment	Completed	Pass
03/19/2025	S1135 Framing Exterior	Add Comment	Completed	Pass
04/02/2025	S1145 Insulation - Ceiling	Add Comment	Completed	Pass
04/02/2025	S1150 Insulation - Wall	Add Comment	Completed	Pass
04/02/2025	S1155 Lath	Add Comment	Completed	Pass
11/26/2024	S1225 Roof Sheathing	Add Comment	Completed	Pass
11/26/2024	S1230 Roof Truss Anchor	Add Comment	Completed	Pass
11/26/2024	S1235 Roof Truss Engineering	Add Comment	Completed	Pass
11/12/2024	S1270 Slab Form	Add Comment	Completed	Pass
11/26/2024	S1360 Wall Sheathing	Add Comment	Completed	Pass
05/15/2025	S1340 Weather Barrier	Add Comment	Completed	Pass
05/15/2025	S1310 Structural Final	Add Comment	Completed	Pass

Conditions

Active	Code	Comment	Due Date
✓	Non Applicable - Mechanical Dept	Date: 7/29/24 Non-Applicable By: Allen G	
✓	Prescreen Rejected	Date: 7.16.24 Comments: See Project Dox.	
✓	Location of Plans	Date: 7.23.24 Permit routed to Elec, Mech, Plb & Struct Dept.	08/15/2024
✓	Approved Electrical Dept	Date: 03/12/25 Approved by James B	
✓	Approved Electrical Dept	Date: 7-25-24 Approved by James B	

✓	Project Dox Submittal	Date: 7/11/24 The application was created and uploaded in projectdox. Pending files to be uploaded from the applicant. Emailed alex@ultradesignbuild.com
✓	Non Applicable - Plumbing Dept	Date: 7/23/24 Non-Applicable. By: P PEDERSEN
✓	Permit Ready to be Issued	Date: 9/23/24 Permit ready to be issued. Balance due $414.82 Emailed Customer at alex@ultradesignbuild.com BATCH STAMP need to update License
✓	Approved Structural Dept	Date: 9/9/24 Approved by Ray W

Notes

Subject	Note	Date
CC	The Certificate of completion has been rejected due to the following: 1- A Truss shop drawing from a certified truss company must be submitted for review. 2- A sub-roofing permit is required according to the alteration scope of work. A roofing permit will not be issued until the truss shop drawing is submitted for review and approved.	05/25/25
Electrical	Approved app	03/12/25
STR Approved	approved	09/09/24
electric	Approved to sub hub/p dox. Need electrical app. rough, final	07/25/24
NA P 24-6024	NO PLUMBING WORK SHOWN ON PLANS	07/23/24

© 2025 Town of Davie

AMERICAN WOOD COUNCIL

SPAN TABLES FOR JOISTS AND RAFTERS

2015 EDITION

American Softwood Lumber Standard (PS 20-15) Sizes

Updates and Errata

While every precaution has been taken to ensure the accuracy of this document, errors may have occurred during development. Updates or Errata are posted to the American Wood Council website at www.awc.org. Technical inquiries may be addressed to info@awc.org.

The American Wood Council (AWC) is the voice of North American traditional and engineered wood products. From a renewable resource that absorbs and sequesters carbon, the wood products industry makes products that are essential to everyday life. AWC's engineers, technologists, scientists, and building code experts develop state-of-the-art engineering data, technology, and standards on structural wood products for use by design professionals, building officials, and wood products manufacturers to assure the safe and efficient design and use of wood structural components.

AMERICAN WOOD COUNCIL

SPAN TABLES FOR JOISTS AND RAFTERS

2015 EDITION

American Softwood Lumber Standard (PS 20-15) Sizes

While every effort has been made to insure the accuracy of the information presented, and special effort has been made to assure that the information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility for any particular design prepared from this publication. Those using this document assume all liability from its use.

Copyright © 2015
American Wood Council
info@awc.org
www.awc.org

TABLE OF CONTENTS

EXPLANATION OF TABLES

1. SCOPE

These span tables for joists and rafters are calculated on the basis of a series of modulus of elasticity (E) and bending design values (F_b). Additionally, compression perpendicular to grain design values ($F_{c\perp}$) are included as a consideration for selection of joists and rafters. The range of values in the tables provides allowable spans for all species and grades of nominal 2-inch framing lumber customarily used in construction. These span tables assume installation of at least three joists or rafters that are spaced not more than 24" on center. The calculated spans assume fully supported members, properly sheathed and nailed on the top edge of the joist or rafter. Straight-line interpolation shall be permitted for intermediate spans and design values.

2. LUMBER DESIGN VALUES

Use of these span tables requires reference to the applicable design values for the various species and grades of lumber. Tables W-1 and W-2 of *Design Values for Joists and Rafters*, a supplement to these span tables, provide such values for the most commonly used framing sizes. Modulus of elasticity (E), bending design values (F_b), and compression design values perpendicular to grain ($F_{c\perp}$) therein are based on the *National Design Specification® (NDS®) for Wood Construction* and incorporate adjustments appropriate for repetitive-member use under various durations of load.

3. LUMBER SIZES

Tabulated spans apply to surfaced (S4S) lumber having dimensions which conform to the American Softwood Lumber Standard, PS 20-10. These sizes are as follows:

Nominal Size	Actual Surfaced Dry Size
2 x 4	1-1/2 x 3-1/2
2 x 6	1-1/2 x 5-1/2
2 x 8	1-1/2 x 7-1/4
2 x 10	1-1/2 x 9-1/4
2 x 12	1-1/2 x 11-1/4

4. MOISTURE CONTENT

The listed dry sizes are based on lumber at 19 percent maximum moisture content. Since the change in dimension that occurs in wet service conditions has already been accounted for in the fully adjusted design value, tabulated spans are applicable to lumber in dry or wet service conditions.

5. SPAN MEASUREMENT

Tabulated spans are the distance from face to face of supports. For sloping rafters the span is measured along the horizontal projection. The commentary provides further information on span measurements including a chart which converts horizontal distances to sloping distances, or vice versa.

6. ROOF LOADS

Rafter spans are tabulated for the most common roof loads. The loads are based on adjusted roof snow loads from the governing building code. For roof live loads less than 20 pounds per square foot (psf), rafter spans and required E values tabulated for 20 psf shall be permitted to be adjusted in accordance with the following table:

	For roof live loads of 12 psf or 16 psf			
Table number	Multiply tabulated span by		Multiply required E-value by	
	12 psf	16 psf	12 psf	16 psf
R-1	1.17	1.07	0.96	0.99
R-5	1.14	1.06	0.89	0.96
R-9	1.12	1.05	0.84	0.94
R-13	1.17	1.07	0.96	0.99
R-17	1.14	1.06	0.89	0.96
R-21	1.12	1.05	0.84	0.94
For intermediate values of roof live loads, use straight line interpolation.				

7. LUMBER IDENTIFICATION

The tabulated spans in these tables apply to lumber identified by the grade stamp of, or certificate of inspection issued by, a lumber grading or inspection bureau or agency recognized as being competent by the Board of Review of the American Lumber Standard Committee or the Canadian Lumber Standards Accreditation Board.

8. GENERAL REQUIREMENTS

The quality of wood products and fasteners and the design of load-supporting members and connections shall conform to the *NDS*. All members shall be so framed, anchored, tied, and braced that they have the necessary strength and rigidity. Adequate bracing and bridging to resist wind and other lateral forces shall be provided.

9. REQUIRED COMPRESSION PERPENDICULAR TO GRAIN

The required compression perpendicular to grain design value, $F_{c\perp}$, for the joist or rafter shall be determined from Table 9.1. The table assumes a total load of 66.67 plf on the joist or rafter. The required $F_{c\perp}$ value shall be permitted to be adjusted in direct proportion to alternate total loads using factors tabulated in Table 9.2. The commentary outlines several examples that include provisions for determining required compression perpendicular to grain design values.

Table 9.1 Required compression perpendicular to grain design values ($F_{c\perp}$) in pounds per square inch for simple span joists and rafters with uniform load.

Span, ft	Bearing Length, in.				
	1.5	2.0	2.5	3.0	3.5
2	30	22	18	15	13
4	59	44	36	30	25
6	89	67	53	44	38
8	119	89	71	59	51
10	148	111	89	74	63
12	178	133	107	89	76
14	207	156	124	104	89
16	237	178	142	119	102
18	267	200	160	133	114
20	296	222	178	148	127
22	326	244	196	163	140
24	356	267	213	178	152
26	385	289	231	193	165

Notes:
1) Bearing width is assumed to be 1.5".
2) Total uniform load is assumed to be 66.67 plf.
3) Alternate $F_{c\perp}$ values are possible by adjusting the tabulated values in direct proportion to the desired load. Adjustment factors are tabulated in Table 9.2.
4) See A.1.3 for 2 span floor joist requirements.

Table 9.2 Adjustment factors for alternate loading and spacing conditions for determining required compression perpendicular to grain design values ($F_{c\perp}$) for joists and rafters.

Loads, psf		On-center spacing, in.			
Live	Dead	12	16	19.2	24
10	5	0.23	0.30	0.36	0.45
20	10	0.45	0.60	0.72	0.90
30	10	0.60	0.80	0.96	1.20
40	10	0.75	1.00	1.20	1.50
50	10	0.90	1.20	1.44	1.80
60	10	1.05	1.40	1.68	2.10
20	15	0.53	0.70	0.84	1.05
30	15	0.68	0.90	1.08	1.35
40	15	0.83	1.10	1.32	1.65
50	15	0.98	1.30	1.56	1.95
20	20	0.60	0.80	0.96	1.20
30	20	0.75	1.00	1.20	1.50
40	20	0.90	1.20	1.44	1.80
50	20	1.05	1.40	1.68	2.10
60	20	1.20	1.60	1.92	2.40

Note: Multiply Table 9.1 values by adjustment factors to obtain required compression perpendicular to grain design values.

TABLE F-1
FLOOR JOISTS WITH L/360 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 30 psf live load.
Limited to span in inches divided by 360.
Strength - Live load of 30 psf plus dead load
of 10 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 6	12.0	9 - 4	9 - 9	10 - 1	10 - 5	10 - 9	11 - 0	11 - 3	11 - 7	11 - 10	12 - 0	12 - 3	12 - 6	12 - 9	12 - 11	13 - 1	13 - 4	13 - 6
	16.0	8 - 6	8 - 10	9 - 2	9 - 6	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	10 - 11	11 - 2	11 - 4	11 - 7	11 - 9	11 - 11	12 - 1	12 - 3
	19.2	8 - 0	8 - 4	8 - 8	8 - 11	9 - 2	9 - 5	9 - 8	9 - 10	10 - 1	10 - 4	10 - 6	10 - 8	10 - 10	11 - 1	11 - 3	11 - 5	11 - 7
	24.0	7 - 5	7 - 9	8 - 0	8 - 3	8 - 6	8 - 9	8 - 11	9 - 2	9 - 4	9 - 7	9 - 9	9 - 11	10 - 1	10 - 3	10 - 5	10 - 7	10 - 9
2x 8	12.0	12 - 4	12 - 10	13 - 4	13 - 9	14 - 2	14 - 6	14 - 11	15 - 3	15 - 7	15 - 10	16 - 2	16 - 6	16 - 9	17 - 0	17 - 4	17 - 7	17 - 10
	16.0	11 - 3	11 - 8	12 - 1	12 - 6	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 5	14 - 8	15 - 0	15 - 3	15 - 6	15 - 9	15 - 11	16 - 2
	19.2	10 - 7	11 - 0	11 - 4	11 - 9	12 - 1	12 - 5	12 - 9	13 - 0	13 - 4	13 - 7	13 - 10	14 - 1	14 - 4	14 - 7	14 - 9	15 - 0	15 - 3
	24.0	9 - 10	10 - 2	10 - 7	10 - 11	11 - 3	11 - 6	11 - 10	12 - 1	12 - 4	12 - 7	12 - 10	13 - 1	13 - 4	13 - 6	13 - 9	13 - 11	14 - 2
2x10	12.0	15 - 9	16 - 5	17 - 0	17 - 6	18 - 0	18 - 6	19 - 0	19 - 5	19 - 10	20 - 3	20 - 8	21 - 0	21 - 5	21 - 9	22 - 1	22 - 5	22 - 9
	16.0	14 - 4	14 - 11	15 - 5	15 - 11	16 - 5	16 - 10	17 - 3	17 - 8	18 - 0	18 - 5	18 - 9	19 - 1	19 - 5	19 - 9	20 - 1	20 - 4	20 - 8
	19.2	13 - 6	14 - 0	14 - 6	15 - 0	15 - 5	15 - 10	16 - 3	16 - 7	17 - 0	17 - 4	17 - 8	18 - 0	18 - 3	18 - 7	18 - 10	19 - 2	19 - 5
	24.0	12 - 6	13 - 0	13 - 6	13 - 11	14 - 4	14 - 8	15 - 1	15 - 5	15 - 9	16 - 1	16 - 5	16 - 8	17 - 0	17 - 3	17 - 6	17 - 9	18 - 0
2x12	12.0	19 - 2	19 - 11	20 - 8	21 - 4	21 - 11	22 - 6	23 - 1	23 - 7	24 - 2	24 - 8	25 - 1	25 - 7	26 - 0	-	-	-	-
	16.0	17 - 5	18 - 1	18 - 9	19 - 4	19 - 11	20 - 6	21 - 0	21 - 6	21 - 11	22 - 5	22 - 10	23 - 3	23 - 7	24 - 0	24 - 5	24 - 9	25 - 1
	19.2	16 - 5	17 - 0	17 - 8	18 - 3	18 - 9	19 - 3	19 - 9	20 - 2	20 - 8	21 - 1	21 - 6	21 - 10	22 - 3	22 - 7	22 - 11	23 - 3	23 - 7
	24.0	15 - 2	15 - 10	16 - 5	16 - 11	17 - 5	17 - 11	18 - 4	18 - 9	19 - 2	19 - 7	19 - 11	20 - 3	20 - 8	21 - 0	21 - 4	21 - 7	21 - 11
F_b	12.0	696	753	808	861	912	962	1,011	1,058	1,105	1,150	1,195	1,239	1,282	1,324	1,366	1,407	1,448
	16.0	766	829	889	947	1,004	1,059	1,112	1,165	1,216	1,266	1,315	1,364	1,411	1,458	1,504	1,549	1,593
	19.2	814	881	945	1,007	1,067	1,125	1,182	1,238	1,292	1,345	1,398	1,449	1,499	1,549	1,598	1,646	1,693
	24.0	877	949	1,018	1,084	1,149	1,212	1,273	1,333	1,392	1,449	1,506	1,561	1,615	1,669	1,721	1,773	1,824

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE F-2
FLOOR JOISTS WITH L/360 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 40 psf live load.
Limited to span in inches divided by 360.
Strength - Live load of 40 psf plus dead load
of 10 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 6	12.0	8 - 6	8 - 10	9 - 2	9 - 6	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	10 - 11	11 - 2	11 - 4	11 - 7	11 - 9	11 - 11	12 - 1	12 - 3
	16.0	7 - 9	8 - 0	8 - 4	8 - 7	8 - 10	9 - 1	9 - 4	9 - 6	9 - 9	9 - 11	10 - 2	10 - 4	10 - 6	10 - 8	10 - 10	11 - 0	11 - 2
	19.2	7 - 3	7 - 7	7 - 10	8 - 1	8 - 4	8 - 7	8 - 9	9 - 0	9 - 2	9 - 4	9 - 6	9 - 8	9 - 10	10 - 0	10 - 2	10 - 4	10 - 6
	24.0	6 - 9	7 - 0	7 - 3	7 - 6	7 - 9	7 - 11	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4	9 - 6	9 - 7	9 - 9
2x 8	12.0	11 - 3	11 - 8	12 - 1	12 - 6	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 5	14 - 8	15 - 0	15 - 3	15 - 6	15 - 9	15 - 11	16 - 2
	16.0	10 - 2	10 - 7	11 - 0	11 - 4	11 - 8	12 - 0	12 - 3	12 - 7	12 - 10	13 - 1	13 - 4	13 - 7	13 - 10	14 - 1	14 - 3	14 - 6	14 - 8
	19.2	9 - 7	10 - 0	10 - 4	10 - 8	11 - 0	11 - 3	11 - 7	11 - 10	12 - 1	12 - 4	12 - 7	12 - 10	13 - 0	13 - 3	13 - 5	13 - 8	13 - 10
	24.0	8 - 11	9 - 3	9 - 7	9 - 11	10 - 2	10 - 6	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8	11 - 11	12 - 1	12 - 3	12 - 6	12 - 8	12 - 10
2x10	12.0	14 - 4	14 - 11	15 - 5	15 - 11	16 - 5	16 - 10	17 - 3	17 - 8	18 - 0	18 - 5	18 - 9	19 - 1	19 - 5	19 - 9	20 - 1	20 - 4	20 - 8
	16.0	13 - 0	13 - 6	14 - 0	14 - 6	14 - 11	15 - 3	15 - 8	16 - 0	16 - 5	16 - 9	17 - 0	17 - 4	17 - 8	17 - 11	18 - 3	18 - 6	18 - 9
	19.2	12 - 3	12 - 9	13 - 2	13 - 7	14 - 0	14 - 5	14 - 9	15 - 1	15 - 5	15 - 9	16 - 0	16 - 4	16 - 7	16 - 11	17 - 2	17 - 5	17 - 8
	24.0	11 - 4	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 7	14 - 11	15 - 2	15 - 5	15 - 8	15 - 11	16 - 2	16 - 5
2x12	12.0	17 - 5	18 - 1	18 - 9	19 - 4	19 - 11	20 - 6	21 - 0	21 - 6	21 - 11	22 - 5	22 - 10	23 - 3	23 - 7	24 - 0	24 - 5	24 - 9	25 - 1
	16.0	15 - 10	16 - 5	17 - 0	17 - 7	18 - 1	18 - 7	19 - 1	19 - 6	19 - 11	20 - 4	20 - 9	21 - 1	21 - 6	21 - 10	22 - 2	22 - 6	22 - 10
	19.2	14 - 11	15 - 6	16 - 0	16 - 7	17 - 0	17 - 6	17 - 11	18 - 4	18 - 9	19 - 2	19 - 6	19 - 10	20 - 2	20 - 6	20 - 10	21 - 2	21 - 6
	24.0	13 - 10	14 - 4	14 - 11	15 - 4	15 - 10	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	18 - 5	18 - 9	19 - 1	19 - 4	19 - 8	19 - 11
F_b	12.0	718	777	833	888	941	993	1,043	1,092	1,140	1,187	1,233	1,278	1,323	1,367	1,410	1,452	1,494
	16.0	790	855	917	977	1,036	1,093	1,148	1,202	1,255	1,306	1,357	1,407	1,456	1,504	1,551	1,598	1,644
	19.2	840	909	975	1,039	1,101	1,161	1,220	1,277	1,333	1,388	1,442	1,495	1,547	1,598	1,649	1,698	1,747
	24.0	905	979	1,050	1,119	1,186	1,251	1,314	1,376	1,436	1,496	1,554	1,611	1,667	1,722	1,776	1,829	1,882

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE F-3
FLOOR JOISTS WITH L/360 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 50 psf live load.
Limited to span in inches divided by 360.
Strength - Live load of 50 psf plus dead load
of 10 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 6	12.0	7 - 11	8 - 3	8 - 6	8 - 9	9 - 1	9 - 3	9 - 6	9 - 9	9 - 11	10 - 2	10 - 4	10 - 6	10 - 9	10 - 11	11 - 1	11 - 3	11 - 5
	16.0	7 - 2	7 - 6	7 - 9	8 - 0	8 - 3	8 - 5	8 - 8	8 - 10	9 - 1	9 - 3	9 - 5	9 - 7	9 - 9	9 - 11	10 - 1	10 - 2	10 - 4
	19.2	6 - 9	7 - 0	7 - 3	7 - 6	7 - 9	7 - 11	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4	9 - 6	9 - 7	9 - 9
	24.0	6 - 3	6 - 6	6 - 9	7 - 0	7 - 2	7 - 4	7 - 7	7 - 9	7 - 11	8 - 1	8 - 3	8 - 4	8 - 6	8 - 8	8 - 9	8 - 11	9 - 1
2x 8	12.0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 3	12 - 7	12 - 10	13 - 1	13 - 5	13 - 8	13 - 11	14 - 2	14 - 4	14 - 7	14 - 10	15 - 0
	16.0	9 - 6	9 - 10	10 - 2	10 - 6	10 - 10	11 - 1	11 - 5	11 - 8	11 - 11	12 - 2	12 - 5	12 - 7	12 - 10	13 - 1	13 - 3	13 - 5	13 - 8
	19.2	8 - 11	9 - 3	9 - 7	9 - 11	10 - 2	10 - 6	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8	11 - 11	12 - 1	12 - 3	12 - 6	12 - 8	12 - 10
	24.0	8 - 3	8 - 7	8 - 11	9 - 2	9 - 6	9 - 9	10 - 0	10 - 2	10 - 5	10 - 8	10 - 10	11 - 0	11 - 3	11 - 5	11 - 7	11 - 9	11 - 11
2x10	12.0	13 - 3	13 - 10	14 - 4	14 - 9	15 - 2	15 - 7	16 - 0	16 - 5	16 - 9	17 - 1	17 - 5	17 - 9	18 - 0	18 - 4	18 - 7	18 - 11	19 - 2
	16.0	12 - 1	12 - 7	13 - 0	13 - 5	13 - 10	14 - 2	14 - 7	14 - 11	15 - 2	15 - 6	15 - 10	16 - 1	16 - 5	16 - 8	16 - 11	17 - 2	17 - 5
	19.2	11 - 4	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 7	14 - 11	15 - 2	15 - 5	15 - 8	15 - 11	16 - 2	16 - 5
	24.0	10 - 7	11 - 0	11 - 4	11 - 9	12 - 1	12 - 5	12 - 8	13 - 0	13 - 3	13 - 7	13 - 10	14 - 1	14 - 4	14 - 7	14 - 9	15 - 0	15 - 2
2x12	12.0	16 - 2	16 - 10	17 - 5	18 - 0	18 - 6	19 - 0	19 - 6	19 - 11	20 - 4	20 - 9	21 - 2	21 - 7	21 - 11	22 - 3	22 - 8	23 - 0	23 - 4
	16.0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 10	17 - 3	17 - 8	18 - 1	18 - 6	18 - 10	19 - 3	19 - 7	19 - 11	20 - 3	20 - 7	20 - 11	21 - 2
	19.2	13 - 10	14 - 4	14 - 11	15 - 4	15 - 10	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	18 - 5	18 - 9	19 - 1	19 - 4	19 - 8	19 - 11
	24.0	12 - 10	13 - 4	13 - 10	14 - 3	14 - 8	15 - 1	15 - 5	15 - 10	16 - 2	16 - 6	16 - 10	17 - 1	17 - 5	17 - 8	18 - 0	18 - 3	18 - 6
F_b	12.0	743	803	862	918	973	1,026	1,078	1,129	1,179	1,228	1,275	1,322	1,368	1,413	1,458	1,502	1,545
	16.0	817	884	949	1,011	1,071	1,130	1,187	1,243	1,298	1,351	1,404	1,455	1,506	1,555	1,604	1,653	1,700
	19.2	869	940	1,008	1,074	1,138	1,201	1,261	1,321	1,379	1,436	1,491	1,546	1,600	1,653	1,705	1,756	1,807
	24.0	936	1,012	1,086	1,157	1,226	1,293	1,359	1,423	1,485	1,547	1,607	1,666	1,724	1,781	1,837	1,892	1,946

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE F-4
FLOOR JOISTS WITH L/360 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 60 psf live load.
Limited to span in inches divided by 360.
Strength - Live load of 60 psf plus dead load
of 10 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 6	12.0	7 - 5	7 - 9	8 - 0	8 - 3	8 - 6	8 - 9	8 - 11	9 - 2	9 - 4	9 - 7	9 - 9	9 - 11	10 - 1	10 - 3	10 - 5	10 - 7	10 - 9
	16.0	6 - 9	7 - 0	7 - 3	7 - 6	7 - 9	7 - 11	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4	9 - 6	9 - 7	9 - 9
	19.2	6 - 4	6 - 7	6 - 10	7 - 1	7 - 3	7 - 6	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 6	8 - 8	8 - 9	8 - 11	9 - 0	9 - 2
	24.0	5 - 11	6 - 2	6 - 4	6 - 7	6 - 9	6 - 11	7 - 1	7 - 3	7 - 5	7 - 7	7 - 9	7 - 10	8 - 0	8 - 2	8 - 3	8 - 5	8 - 6
2x 8	12.0	9 - 10	10 - 2	10 - 7	10 - 11	11 - 3	11 - 6	11 - 10	12 - 1	12 - 4	12 - 7	12 - 10	13 - 1	13 - 4	13 - 6	13 - 9	13 - 11	14 - 2
	16.0	8 - 11	9 - 3	9 - 7	9 - 11	10 - 2	10 - 6	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8	11 - 11	12 - 1	12 - 3	12 - 6	12 - 8	12 - 10
	19.2	8 - 5	8 - 9	9 - 0	9 - 4	9 - 7	9 - 10	10 - 1	10 - 4	10 - 7	10 - 9	11 - 0	11 - 2	11 - 4	11 - 7	11 - 9	11 - 11	12 - 1
	24.0	7 - 9	8 - 1	8 - 5	8 - 8	8 - 11	9 - 2	9 - 4	9 - 7	9 - 10	10 - 0	10 - 2	10 - 5	10 - 7	10 - 9	10 - 11	11 - 1	11 - 3
2x10	12.0	12 - 6	13 - 0	13 - 6	13 - 11	14 - 4	14 - 8	15 - 1	15 - 5	15 - 9	16 - 1	16 - 5	16 - 8	17 - 0	17 - 3	17 - 6	17 - 9	18 - 0
	16.0	11 - 4	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 7	14 - 11	15 - 2	15 - 5	15 - 8	15 - 11	16 - 2	16 - 5
	19.2	10 - 8	11 - 1	11 - 6	11 - 11	12 - 3	12 - 7	12 - 11	13 - 2	13 - 6	13 - 9	14 - 0	14 - 3	14 - 6	14 - 9	15 - 0	15 - 2	15 - 5
	24.0	9 - 11	10 - 4	10 - 8	11 - 0	11 - 4	11 - 8	11 - 11	12 - 3	12 - 6	12 - 9	13 - 0	13 - 3	13 - 6	13 - 8	13 - 11	14 - 1	14 - 4
2x12	12.0	15 - 2	15 - 10	16 - 5	16 - 11	17 - 5	17 - 11	18 - 4	18 - 9	19 - 2	19 - 7	19 - 11	20 - 3	20 - 8	21 - 0	21 - 4	21 - 7	21 - 11
	16.0	13 - 10	14 - 4	14 - 11	15 - 4	15 - 10	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	18 - 5	18 - 9	19 - 1	19 - 4	19 - 8	19 - 11
	19.2	13 - 0	13 - 6	14 - 0	14 - 5	14 - 11	15 - 3	15 - 8	16 - 0	16 - 5	16 - 9	17 - 0	17 - 4	17 - 8	17 - 11	18 - 3	18 - 6	18 - 9
	24.0	12 - 1	12 - 7	13 - 0	13 - 5	13 - 10	14 - 2	14 - 7	14 - 11	15 - 2	15 - 6	15 - 10	16 - 1	16 - 5	16 - 8	16 - 11	17 - 2	17 - 5
F_b	12.0	767	830	890	949	1,005	1,061	1,114	1,167	1,218	1,268	1,317	1,366	1,413	1,460	1,506	1,551	1,596
	16.0	844	913	980	1,044	1,107	1,167	1,226	1,284	1,341	1,396	1,450	1,503	1,556	1,607	1,658	1,707	1,757
	19.2	897	971	1,041	1,110	1,176	1,240	1,303	1,365	1,425	1,483	1,541	1,597	1,653	1,708	1,761	1,814	1,867
	24.0	967	1,046	1,122	1,195	1,267	1,336	1,404	1,470	1,535	1,598	1,660	1,721	1,781	1,840	1,897	1,955	2,011

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE F-5
FLOOR JOISTS WITH L/360 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 40 psf live load.
Limited to span in inches divided by 360.
Strength - Live load of 40 psf plus dead load
of 20 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 6	12.0	8 - 6	8 - 10	9 - 2	9 - 6	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	10 - 11	11 - 2	11 - 4	11 - 7	11 - 9	11 - 11	12 - 1	12 - 3
	16.0	7 - 9	8 - 0	8 - 4	8 - 7	8 - 10	9 - 1	9 - 4	9 - 6	9 - 9	9 - 11	10 - 2	10 - 4	10 - 6	10 - 8	10 - 10	11 - 0	11 - 2
	19.2	7 - 3	7 - 7	7 - 10	8 - 1	8 - 4	8 - 7	8 - 9	9 - 0	9 - 2	9 - 4	9 - 6	9 - 8	9 - 10	10 - 0	10 - 2	10 - 4	10 - 6
	24.0	6 - 9	7 - 0	7 - 3	7 - 6	7 - 9	7 - 11	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4	9 - 6	9 - 7	9 - 9
2x 8	12.0	11 - 3	11 - 8	12 - 1	12 - 6	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 5	14 - 8	15 - 0	15 - 3	15 - 6	15 - 9	15 - 11	16 - 2
	16.0	10 - 2	10 - 7	11 - 0	11 - 4	11 - 8	12 - 0	12 - 3	12 - 7	12 - 10	13 - 1	13 - 4	13 - 7	13 - 10	14 - 1	14 - 3	14 - 6	14 - 8
	19.2	9 - 7	10 - 0	10 - 4	10 - 8	11 - 0	11 - 3	11 - 7	11 - 10	12 - 1	12 - 4	12 - 7	12 - 10	13 - 0	13 - 3	13 - 5	13 - 8	13 - 10
	24.0	8 - 11	9 - 3	9 - 7	9 - 11	10 - 2	10 - 6	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8	11 - 11	12 - 1	12 - 3	12 - 6	12 - 8	12 - 10
2x10	12.0	14 - 4	14 - 11	15 - 5	15 - 11	16 - 5	16 - 10	17 - 3	17 - 8	18 - 0	18 - 5	18 - 9	19 - 1	19 - 5	19 - 9	20 - 1	20 - 4	20 - 8
	16.0	13 - 0	13 - 6	14 - 0	14 - 6	14 - 11	15 - 3	15 - 8	16 - 0	16 - 5	16 - 9	17 - 0	17 - 4	17 - 8	17 - 11	18 - 3	18 - 6	18 - 9
	19.2	12 - 3	12 - 9	13 - 2	13 - 7	14 - 0	14 - 5	14 - 9	15 - 1	15 - 5	15 - 9	16 - 0	16 - 4	16 - 7	16 - 11	17 - 2	17 - 5	17 - 8
	24.0	11 - 4	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 7	14 - 11	15 - 2	15 - 5	15 - 8	15 - 11	16 - 2	16 - 5
2x12	12.0	17 - 5	18 - 1	18 - 9	19 - 4	19 - 11	20 - 6	21 - 0	21 - 6	21 - 11	22 - 5	22 - 10	23 - 3	23 - 7	24 - 0	24 - 5	24 - 9	25 - 1
	16.0	15 - 10	16 - 5	17 - 0	17 - 7	18 - 1	18 - 7	19 - 1	19 - 6	19 - 11	20 - 4	20 - 9	21 - 1	21 - 6	21 - 10	22 - 2	22 - 6	22 - 10
	19.2	14 - 11	15 - 6	16 - 0	16 - 7	17 - 0	17 - 6	17 - 11	18 - 4	18 - 9	19 - 2	19 - 6	19 - 10	20 - 2	20 - 6	20 - 10	21 - 2	21 - 6
	24.0	13 - 10	14 - 4	14 - 11	15 - 4	15 - 10	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	18 - 5	18 - 9	19 - 1	19 - 4	19 - 8	19 - 11
F_b	12.0	862	932	1,000	1,066	1,129	1,191	1,251	1,310	1,368	1,424	1,480	1,534	1,587	1,640	1,692	1,742	1,793
	16.0	949	1,026	1,101	1,173	1,243	1,311	1,377	1,442	1,506	1,568	1,629	1,688	1,747	1,805	1,862	1,918	1,973
	19.2	1,008	1,090	1,170	1,246	1,321	1,393	1,464	1,533	1,600	1,666	1,731	1,794	1,857	1,918	1,978	2,038	2,097
	24.0	1,086	1,174	1,260	1,343	1,423	1,501	1,577	1,651	1,724	1,795	1,864	1,933	2,000	2,066	2,131	2,195	2,258

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE F-6
FLOOR JOISTS WITH L/360 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 50 psf live load.
Limited to span in inches divided by 360.
Strength - Live load of 50 psf plus dead load
of 20 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 6	12.0	7 - 11	8 - 3	8 - 6	8 - 9	9 - 1	9 - 3	9 - 6	9 - 9	9 - 11	10 - 2	10 - 4	10 - 6	10 - 9	10 - 11	11 - 1	11 - 3	11 - 5
	16.0	7 - 2	7 - 6	7 - 9	8 - 0	8 - 3	8 - 5	8 - 8	8 - 10	9 - 1	9 - 3	9 - 5	9 - 7	9 - 9	9 - 11	10 - 1	10 - 2	10 - 4
	19.2	6 - 9	7 - 0	7 - 3	7 - 6	7 - 9	7 - 11	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4	9 - 6	9 - 7	9 - 9
	24.0	6 - 3	6 - 6	6 - 9	7 - 0	7 - 2	7 - 4	7 - 7	7 - 9	7 - 11	8 - 1	8 - 3	8 - 4	8 - 6	8 - 8	8 - 9	8 - 11	9 - 1
2x 8	12.0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 3	12 - 7	12 - 10	13 - 1	13 - 5	13 - 8	13 - 11	14 - 2	14 - 4	14 - 7	14 - 10	15 - 0
	16.0	9 - 6	9 - 10	10 - 2	10 - 6	10 - 10	11 - 1	11 - 5	11 - 8	11 - 11	12 - 2	12 - 5	12 - 7	12 - 10	13 - 1	13 - 3	13 - 5	13 - 8
	19.2	8 - 11	9 - 3	9 - 7	9 - 11	10 - 2	10 - 6	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8	11 - 11	12 - 1	12 - 3	12 - 6	12 - 8	12 - 10
	24.0	8 - 3	8 - 7	8 - 11	9 - 2	9 - 6	9 - 9	10 - 0	10 - 2	10 - 5	10 - 8	10 - 10	11 - 0	11 - 3	11 - 5	11 - 7	11 - 9	11 - 11
2x10	12.0	13 - 3	13 - 10	14 - 4	14 - 9	15 - 2	15 - 7	16 - 0	16 - 5	16 - 9	17 - 1	17 - 5	17 - 9	18 - 0	18 - 4	18 - 7	18 - 11	19 - 2
	16.0	12 - 1	12 - 7	13 - 0	13 - 5	13 - 10	14 - 2	14 - 7	14 - 11	15 - 2	15 - 6	15 - 10	16 - 1	16 - 5	16 - 8	16 - 11	17 - 2	17 - 5
	19.2	11 - 4	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 7	14 - 11	15 - 2	15 - 5	15 - 8	15 - 11	16 - 2	16 - 5
	24.0	10 - 7	11 - 0	11 - 4	11 - 9	12 - 1	12 - 5	12 - 8	13 - 0	13 - 3	13 - 7	13 - 10	14 - 1	14 - 4	14 - 7	14 - 9	15 - 0	15 - 2
2x12	12.0	16 - 2	16 - 10	17 - 5	18 - 0	18 - 6	19 - 0	19 - 6	19 - 11	20 - 4	20 - 9	21 - 2	21 - 7	21 - 11	22 - 3	22 - 8	23 - 0	23 - 4
	16.0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 10	17 - 3	17 - 8	18 - 1	18 - 6	18 - 10	19 - 3	19 - 7	19 - 11	20 - 3	20 - 7	20 - 11	21 - 2
	19.2	13 - 10	14 - 4	14 - 11	15 - 4	15 - 10	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	18 - 5	18 - 9	19 - 1	19 - 4	19 - 8	19 - 11
	24.0	12 - 10	13 - 4	13 - 10	14 - 3	14 - 8	15 - 1	15 - 5	15 - 10	16 - 2	16 - 6	16 - 10	17 - 1	17 - 5	17 - 8	18 - 0	18 - 3	18 - 6
F_b	12.0	866	937	1,005	1,071	1,135	1,198	1,258	1,317	1,375	1,432	1,488	1,542	1,596	1,649	1,701	1,752	1,802
	16.0	954	1,032	1,107	1,179	1,250	1,318	1,385	1,450	1,514	1,576	1,637	1,698	1,757	1,815	1,872	1,928	1,984
	19.2	1,013	1,096	1,176	1,253	1,328	1,401	1,472	1,541	1,609	1,675	1,740	1,804	1,867	1,928	1,989	2,049	2,108
	24.0	1,092	1,181	1,267	1,350	1,430	1,509	1,585	1,660	1,733	1,804	1,874	1,943	2,011	2,077	2,143	2,207	2,271

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE F-7
FLOOR JOISTS WITH L/360 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 60 psf live load.
Limited to span in inches divided by 360.
Strength - Live load of 60 psf plus dead load
of 20 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 6	12.0	7 - 5	7 - 9	8 - 0	8 - 3	8 - 6	8 - 9	8 - 11	9 - 2	9 - 4	9 - 7	9 - 9	9 - 11	10 - 1	10 - 3	10 - 5	10 - 7	10 - 9
	16.0	6 - 9	7 - 0	7 - 3	7 - 6	7 - 9	7 - 11	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4	9 - 6	9 - 7	9 - 9
	19.2	6 - 4	6 - 7	6 - 10	7 - 1	7 - 3	7 - 6	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 6	8 - 8	8 - 9	8 - 11	9 - 0	9 - 2
	24.0	5 - 11	6 - 2	6 - 4	6 - 7	6 - 9	6 - 11	7 - 1	7 - 3	7 - 5	7 - 7	7 - 9	7 - 10	8 - 0	8 - 2	8 - 3	8 - 5	8 - 6
2x 8	12.0	9 - 10	10 - 2	10 - 7	10 - 11	11 - 3	11 - 6	11 - 10	12 - 1	12 - 4	12 - 7	12 - 10	13 - 1	13 - 4	13 - 6	13 - 9	13 - 11	14 - 2
	16.0	8 - 11	9 - 3	9 - 7	9 - 11	10 - 2	10 - 6	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8	11 - 11	12 - 1	12 - 3	12 - 6	12 - 8	12 - 10
	19.2	8 - 5	8 - 9	9 - 0	9 - 4	9 - 7	9 - 10	10 - 1	10 - 4	10 - 7	10 - 9	11 - 0	11 - 2	11 - 4	11 - 7	11 - 9	11 - 11	12 - 1
	24.0	7 - 9	8 - 1	8 - 5	8 - 8	8 - 11	9 - 2	9 - 4	9 - 7	9 - 10	10 - 0	10 - 2	10 - 5	10 - 7	10 - 9	10 - 11	11 - 1	11 - 3
2x10	12.0	12 - 6	13 - 0	13 - 6	13 - 11	14 - 4	14 - 8	15 - 1	15 - 5	15 - 9	16 - 1	16 - 5	16 - 8	17 - 0	17 - 3	17 - 6	17 - 9	18 - 0
	16.0	11 - 4	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 7	14 - 11	15 - 2	15 - 5	15 - 8	15 - 11	16 - 2	16 - 5
	19.2	10 - 8	11 - 1	11 - 6	11 - 11	12 - 3	12 - 7	12 - 11	13 - 2	13 - 6	13 - 9	14 - 0	14 - 3	14 - 6	14 - 9	15 - 0	15 - 2	15 - 5
	24.0	9 - 11	10 - 4	10 - 8	11 - 0	11 - 4	11 - 8	11 - 11	12 - 3	12 - 6	12 - 9	13 - 0	13 - 3	13 - 6	13 - 8	13 - 11	14 - 1	14 - 4
2x12	12.0	15 - 2	15 - 10	16 - 5	16 - 11	17 - 5	17 - 11	18 - 4	18 - 9	19 - 2	19 - 7	19 - 11	20 - 3	20 - 8	21 - 0	21 - 4	21 - 7	21 - 11
	16.0	13 - 10	14 - 4	14 - 11	15 - 4	15 - 10	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	18 - 5	18 - 9	19 - 1	19 - 4	19 - 8	19 - 11
	19.2	13 - 0	13 - 6	14 - 0	14 - 5	14 - 11	15 - 3	15 - 8	16 - 0	16 - 5	16 - 9	17 - 0	17 - 4	17 - 8	17 - 11	18 - 3	18 - 6	18 - 9
	24.0	12 - 1	12 - 7	13 - 0	13 - 5	13 - 10	14 - 2	14 - 7	14 - 11	15 - 2	15 - 6	15 - 10	16 - 1	16 - 5	16 - 8	16 - 11	17 - 2	17 - 5
F_b	12.0	877	949	1,018	1,084	1,149	1,212	1,273	1,333	1,392	1,449	1,506	1,561	1,615	1,669	1,721	1,773	1,824
	16.0	965	1,044	1,120	1,193	1,265	1,334	1,402	1,468	1,532	1,595	1,657	1,718	1,778	1,837	1,894	1,951	2,008
	19.2	1,026	1,109	1,190	1,268	1,344	1,418	1,489	1,559	1,628	1,695	1,761	1,826	1,889	1,952	2,013	2,074	2,133
	24.0	1,105	1,195	1,282	1,366	1,448	1,527	1,604	1,680	1,754	1,826	1,897	1,967	2,035	2,102	2,169	2,234	2,298

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE C-1
CEILING JOISTS WITH L/240 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 10 psf live load.
Limited to span in inches divided by 240.
Strength - Live load of 10 psf plus dead load
of 5 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 4	12.0	9 - 10	10 - 3	10 - 7	10 - 11	11 - 3	11 - 7	11 - 10	12 - 2	12 - 5	12 - 8	12 - 11	13 - 2	13 - 4	13 - 7	13 - 9	14 - 0	14 - 2
	16.0	8 - 11	9 - 4	9 - 8	9 - 11	10 - 3	10 - 6	10 - 9	11 - 0	11 - 3	11 - 6	11 - 9	11 - 11	12 - 2	12 - 4	12 - 6	12 - 9	12 - 11
	19.2	8 - 5	8 - 9	9 - 1	9 - 4	9 - 8	9 - 11	10 - 2	10 - 4	10 - 7	10 - 10	11 - 0	11 - 3	11 - 5	11 - 7	11 - 9	12 - 0	12 - 2
	24.0	7 - 10	8 - 1	8 - 5	8 - 8	8 - 11	9 - 2	9 - 5	9 - 8	9 - 10	10 - 0	10 - 3	10 - 5	10 - 7	10 - 9	10 - 11	11 - 1	11 - 3
2x 6	12.0	15 - 6	16 - 1	16 - 8	17 - 2	17 - 8	18 - 2	18 - 8	19 - 1	19 - 6	19 - 11	20 - 3	20 - 8	21 - 0	21 - 4	21 - 8	22 - 0	22 - 4
	16.0	14 - 1	14 - 7	15 - 2	15 - 7	16 - 1	16 - 6	16 - 11	17 - 4	17 - 8	18 - 1	18 - 5	18 - 9	19 - 1	19 - 5	19 - 8	20 - 0	20 - 3
	19.2	13 - 3	13 - 9	14 - 3	14 - 8	15 - 2	15 - 7	15 - 11	16 - 4	16 - 8	17 - 0	17 - 4	17 - 8	17 - 11	18 - 3	18 - 6	18 - 10	19 - 1
	24.0	12 - 3	12 - 9	13 - 3	13 - 8	14 - 1	14 - 5	14 - 9	15 - 2	15 - 6	15 - 9	16 - 1	16 - 4	16 - 8	16 - 11	17 - 2	17 - 5	17 - 8
2x 8	12.0	20 - 5	21 - 2	21 - 11	22 - 8	23 - 4	24 - 0	24 - 7	25 - 2	25 - 8	-	-	-	-	-	-	-	-
	16.0	18 - 6	19 - 3	19 - 11	20 - 7	21 - 2	21 - 9	22 - 4	22 - 10	23 - 4	23 - 10	24 - 3	24 - 8	25 - 2	25 - 7	25 - 11	-	-
	19.2	17 - 5	18 - 2	18 - 9	19 - 5	19 - 11	20 - 6	21 - 0	21 - 6	21 - 11	22 - 5	22 - 10	23 - 3	23 - 8	24 - 0	24 - 5	24 - 9	25 - 2
	24.0	16 - 2	16 - 10	17 - 5	18 - 0	18 - 6	19 - 0	19 - 6	19 - 11	20 - 5	20 - 10	21 - 2	21 - 7	21 - 11	22 - 4	22 - 8	23 - 0	23 - 4
2x10	12.0	26 - 0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	23 - 8	24 - 7	25 - 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19.2	22 - 3	23 - 2	23 - 11	24 - 9	25 - 5	-	-	-	-	-	-	-	-	-	-	-	-
	24.0	20 - 8	21 - 6	22 - 3	22 - 11	23 - 8	24 - 3	24 - 10	25 - 5	26 - 0	-	-	-	-	-	-	-	-
F_b	12.0	711	769	825	880	932	983	1,033	1,082	1,129	1,176	1,221	1,266	1,310	1,354	1,396	1,438	1,480
	16.0	783	847	909	968	1,026	1,082	1,137	1,191	1,243	1,294	1,344	1,394	1,442	1,490	1,537	1,583	1,629
	19.2	832	900	965	1,029	1,090	1,150	1,208	1,265	1,321	1,375	1,429	1,481	1,533	1,583	1,633	1,682	1,731
	24.0	896	969	1,040	1,108	1,174	1,239	1,302	1,363	1,423	1,481	1,539	1,595	1,651	1,706	1,759	1,812	1,864

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE C-2
CEILING JOISTS WITH L/240 DEFLECTION LIMITS

DESIGN CRITERIA:
Deflection - For 20 psf live load.
Limited to span in inches divided by 240.
Strength - Live load of 20 psf plus dead load
of 10 psf determines the required bending design value.

Joist Size (in)	Spacing (in)	Modulus of Elasticity, E, in 1,000,000 psi																
		0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
2x 4	12.0	7 - 10	8 - 1	8 - 5	8 - 8	8 - 11	9 - 2	9 - 5	9 - 8	9 - 10	10 - 0	10 - 3	10 - 5	10 - 7	10 - 9	10 - 11	11 - 1	11 - 3
	16.0	7 - 1	7 - 5	7 - 8	7 - 11	8 - 1	8 - 4	8 - 7	8 - 9	8 - 11	9 - 1	9 - 4	9 - 6	9 - 8	9 - 9	9 - 11	10 - 1	10 - 3
	19.2	6 - 8	6 - 11	7 - 2	7 - 5	7 - 8	7 - 10	8 - 1	8 - 3	8 - 5	8 - 7	8 - 9	8 - 11	9 - 1	9 - 3	9 - 4	9 - 6	9 - 8
	24.0	6 - 2	6 - 5	6 - 8	6 - 11	7 - 1	7 - 3	7 - 6	7 - 8	7 - 10	8 - 0	8 - 1	8 - 3	8 - 5	8 - 7	8 - 8	8 - 10	8 - 11
2x 6	12.0	12 - 3	12 - 9	13 - 3	13 - 8	14 - 1	14 - 5	14 - 9	15 - 2	15 - 6	15 - 9	16 - 1	16 - 4	16 - 8	16 - 11	17 - 2	17 - 5	17 - 8
	16.0	11 - 2	11 - 7	12 - 0	12 - 5	12 - 9	13 - 1	13 - 5	13 - 9	14 - 1	14 - 4	14 - 7	14 - 11	15 - 2	15 - 5	15 - 7	15 - 10	16 - 1
	19.2	10 - 6	10 - 11	11 - 4	11 - 8	12 - 0	12 - 4	12 - 8	12 - 11	13 - 3	13 - 6	13 - 9	14 - 0	14 - 3	14 - 6	14 - 8	14 - 11	15 - 2
	24.0	9 - 9	10 - 2	10 - 6	10 - 10	11 - 2	11 - 5	11 - 9	12 - 0	12 - 3	12 - 6	12 - 9	13 - 0	13 - 3	13 - 5	13 - 8	13 - 10	14 - 1
2x 8	12.0	16 - 2	16 - 10	17 - 5	18 - 0	18 - 6	19 - 0	19 - 6	19 - 11	20 - 5	20 - 10	21 - 2	21 - 7	21 - 11	22 - 4	22 - 8	23 - 0	23 - 4
	16.0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 10	17 - 3	17 - 9	18 - 2	18 - 6	18 - 11	19 - 3	19 - 7	19 - 11	20 - 3	20 - 7	20 - 11	21 - 2
	19.2	13 - 10	14 - 5	14 - 11	15 - 5	15 - 10	16 - 3	16 - 8	17 - 1	17 - 5	17 - 9	18 - 2	18 - 5	18 - 9	19 - 1	19 - 5	19 - 8	19 - 11
	24.0	12 - 10	13 - 4	13 - 10	14 - 3	14 - 8	15 - 1	15 - 6	15 - 10	16 - 2	16 - 6	16 - 10	17 - 2	17 - 5	17 - 9	18 - 0	18 - 3	18 - 6
2x10	12.0	20 - 8	21 - 6	22 - 3	22 - 11	23 - 8	24 - 3	24 - 10	25 - 5	26 - 0	-	-	-	-	-	-	-	-
	16.0	18 - 9	19 - 6	20 - 2	20 - 10	21 - 6	22 - 1	22 - 7	23 - 2	23 - 8	24 - 1	24 - 7	25 - 0	25 - 5	25 - 10	-	-	-
	19.2	17 - 8	18 - 4	19 - 0	19 - 7	20 - 2	20 - 9	21 - 3	21 - 9	22 - 3	22 - 8	23 - 2	23 - 7	23 - 11	24 - 4	24 - 9	25 - 1	25 - 5
	24.0	16 - 5	17 - 0	17 - 8	18 - 3	18 - 9	19 - 3	19 - 9	20 - 2	20 - 8	21 - 1	21 - 6	21 - 10	22 - 3	22 - 7	22 - 11	23 - 4	23 - 8
F_b	12.0	896	969	1,040	1,108	1,174	1,239	1,302	1,363	1,423	1,481	1,539	1,595	1,651	1,706	1,759	1,812	1,864
	16.0	986	1,067	1,145	1,220	1,293	1,364	1,433	1,500	1,566	1,631	1,694	1,756	1,817	1,877	1,936	1,995	2,052
	19.2	1,048	1,134	1,216	1,296	1,374	1,449	1,522	1,594	1,664	1,733	1,800	1,866	1,931	1,995	2,058	2,120	2,181
	24.0	1,129	1,221	1,310	1,396	1,480	1,561	1,640	1,717	1,793	1,866	1,939	2,010	2,080	2,149	2,217	2,283	2,349

Note: The required bending design value, F_b, in pounds per square inch is shown at the bottom of each table and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-1
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 20 psf plus
Dead Load of 10 psf determines the required bending design value
Deflection - For 20 psf live load.
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																				
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
2x 6	12.0	7 - 1	8 - 2	9 - 2	10 - 0	10 - 10	11 - 7	12 - 4	13 - 0	13 - 7	14 - 2	14 - 9	15 - 4	15 - 11	16 - 5	16 - 11	17 - 5	17 - 10	-	-	-	-	-
	16.0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 5	10 - 0	10 - 8	11 - 3	11 - 9	12 - 4	12 - 10	13 - 3	13 - 9	14 - 2	14 - 8	15 - 1	15 - 6	15 - 11	16 - 3	-	-	-
	19.2	5 - 7	6 - 6	7 - 3	7 - 11	8 - 7	9 - 2	9 - 9	10 - 3	10 - 9	11 - 3	11 - 8	12 - 2	12 - 7	13 - 0	13 - 4	13 - 9	14 - 2	14 - 6	14 - 10	15 - 2	15 - 7	-
	24.0	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	13 - 7	13 - 11	14 - 2
2x 8	12.0	9 - 4	10 - 10	12 - 1	13 - 3	14 - 4	15 - 3	16 - 3	17 - 1	17 - 11	18 - 9	19 - 6	20 - 3	20 - 11	21 - 7	22 - 3	22 - 11	23 - 7	-	-	-	-	-
	16.0	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 0	14 - 10	15 - 6	16 - 3	16 - 10	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	21 - 5	-	-	-
	19.2	7 - 5	8 - 7	9 - 7	10 - 6	11 - 4	12 - 1	12 - 10	13 - 6	14 - 2	14 - 10	15 - 5	16 - 0	16 - 7	17 - 1	17 - 7	18 - 2	18 - 7	19 - 1	19 - 7	20 - 0	20 - 6	-
	24.0	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	17 - 11	18 - 4	18 - 9
2x10	12.0	11 - 11	13 - 9	15 - 5	16 - 11	18 - 3	19 - 6	20 - 8	21 - 10	22 - 10	23 - 11	24 - 10	25 - 10	-	-	-	-	-	-	-	-	-	-
	16.0	10 - 4	11 - 11	13 - 4	14 - 8	15 - 10	16 - 11	17 - 11	18 - 11	19 - 10	20 - 8	21 - 6	22 - 4	23 - 2	23 - 11	24 - 7	25 - 4	26 - 0	-	-	-	-	-
	19.2	9 - 5	10 - 11	12 - 2	13 - 4	14 - 5	15 - 5	16 - 4	17 - 3	18 - 1	18 - 11	19 - 8	20 - 5	21 - 1	21 - 10	22 - 6	23 - 2	23 - 9	24 - 5	25 - 0	25 - 7	-	-
	24.0	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	22 - 10	23 - 5	23 - 11
2x12	12.0	14 - 6	16 - 9	18 - 9	20 - 6	22 - 2	23 - 9	25 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	12 - 7	14 - 6	16 - 3	17 - 9	19 - 3	20 - 6	21 - 9	23 - 0	24 - 1	25 - 2	-	-	-	-	-	-	-	-	-	-	-	-
	19.2	11 - 6	13 - 3	14 - 10	16 - 3	17 - 6	18 - 9	19 - 11	21 - 0	22 - 0	23 - 0	23 - 11	24 - 10	25 - 8	-	-	-	-	-	-	-	-	-
	24.0	10 - 3	11 - 10	13 - 3	14 - 6	15 - 8	16 - 9	17 - 9	18 - 9	19 - 8	20 - 6	21 - 5	22 - 2	23 - 0	23 - 9	24 - 5	25 - 2	25 - 10	-	-	-	-	-
E	12.0	0.15	0.24	0.33	0.44	0.55	0.67	0.80	0.94	1.09	1.24	1.40	1.56	1.73	1.91	2.09	2.28	2.47	-	-	-	-	-
	16.0	0.13	0.21	0.29	0.38	0.48	0.58	0.70	0.82	0.94	1.07	1.21	1.35	1.50	1.65	1.81	1.97	2.14	2.31	2.48	-	-	-
	19.2	0.12	0.19	0.26	0.35	0.44	0.53	0.64	0.75	0.86	0.98	1.10	1.23	1.37	1.51	1.65	1.80	1.95	2.11	2.27	2.43	2.60	-
	24.0	0.11	0.17	0.24	0.31	0.39	0.48	0.57	0.67	0.77	0.88	0.99	1.10	1.22	1.35	1.48	1.61	1.75	1.89	2.03	2.18	2.33	2.48

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-2
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 30 psf plus
Dead Load of 10 psf determines the required bending design value
Deflection - For 30 psf live load
Limited to span in inches divided by 240

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																					
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
2x6	12.0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 5	10 - 0	10 - 8	11 - 3	11 - 9	12 - 4	12 - 10	13 - 3	13 - 9	14 - 2	14 - 8	15 - 1	15 - 6	15 - 11	-	-	-	-
	16.0	5 - 4	6 - 2	6 - 11	7 - 6	8 - 2	8 - 8	9 - 3	9 - 9	10 - 2	10 - 8	11 - 1	11 - 6	11 - 11	12 - 4	12 - 8	13 - 1	13 - 5	13 - 9	14 - 1	14 - 5	-	-
	19.2	4 - 10	5 - 7	6 - 3	6 - 11	7 - 5	7 - 11	8 - 5	8 - 11	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 3	11 - 7	11 - 11	12 - 3	12 - 7	12 - 10	13 - 2	13 - 6	-
	24.0	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4
2x8	12.0	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 0	14 - 10	15 - 6	16 - 3	16 - 10	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	-	-	-	-
	16.0	7 - 0	8 - 1	9 - 1	9 - 11	10 - 9	11 - 6	12 - 2	12 - 10	13 - 5	14 - 0	14 - 7	15 - 2	15 - 8	16 - 3	16 - 9	17 - 2	17 - 8	18 - 2	18 - 7	19 - 0	-	-
	19.2	6 - 5	7 - 5	8 - 3	9 - 1	9 - 9	10 - 6	11 - 1	11 - 8	12 - 3	12 - 10	13 - 4	13 - 10	14 - 4	14 - 10	15 - 3	15 - 8	16 - 2	16 - 7	16 - 11	17 - 4	17 - 9	-
	24.0	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3
2x10	12.0	10 - 4	11 - 11	13 - 4	14 - 8	15 - 10	16 - 11	17 - 11	18 - 11	19 - 10	20 - 8	21 - 6	22 - 4	23 - 2	23 - 11	24 - 7	25 - 4	26 - 0	-	-	-	-	-
	16.0	8 - 11	10 - 4	11 - 7	12 - 8	13 - 8	14 - 8	15 - 6	16 - 4	17 - 2	17 - 11	18 - 8	19 - 4	20 - 0	20 - 8	21 - 4	21 - 11	22 - 6	23 - 2	23 - 8	24 - 3	-	-
	19.2	8 - 2	9 - 5	10 - 7	11 - 7	12 - 6	13 - 4	14 - 2	14 - 11	15 - 8	16 - 4	17 - 0	17 - 8	18 - 3	18 - 11	19 - 6	20 - 0	20 - 7	21 - 1	21 - 8	22 - 2	22 - 8	-
	24.0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8
2x12	12.0	12 - 7	14 - 6	16 - 3	17 - 9	19 - 3	20 - 6	21 - 9	23 - 0	24 - 1	25 - 2	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	10 - 11	12 - 7	14 - 1	15 - 5	16 - 8	17 - 9	18 - 10	19 - 11	20 - 10	21 - 9	22 - 8	23 - 6	24 - 4	25 - 2	25 - 11	-	-	-	-	-	-	-
	19.2	9 - 11	11 - 6	12 - 10	14 - 1	15 - 2	16 - 3	17 - 3	18 - 2	19 - 0	19 - 11	20 - 8	21 - 6	22 - 3	23 - 0	23 - 8	24 - 4	25 - 0	25 - 8	-	-	-	-
	24.0	8 - 11	10 - 3	11 - 6	12 - 7	13 - 7	14 - 6	15 - 5	16 - 3	17 - 0	17 - 9	18 - 6	19 - 3	19 - 11	20 - 6	21 - 2	21 - 9	22 - 5	23 - 0	23 - 6	24 - 1	24 - 8	25 - 2
E	12.0	0.15	0.23	0.32	0.43	0.54	0.66	0.78	0.92	1.06	1.21	1.36	1.52	1.69	1.86	2.04	2.22	2.41	2.60	-	-	-	-
	16.0	0.13	0.20	0.28	0.37	0.47	0.57	0.68	0.80	0.92	1.05	1.18	1.32	1.46	1.61	1.76	1.92	2.08	2.25	2.42	2.60	-	-
	19.2	0.12	0.18	0.26	0.34	0.43	0.52	0.62	0.73	0.84	0.95	1.08	1.20	1.33	1.47	1.61	1.75	1.90	2.05	2.21	2.37	2.53	-
	24.0	0.11	0.16	0.23	0.30	0.38	0.46	0.55	0.65	0.75	0.85	0.96	1.08	1.19	1.31	1.44	1.57	1.70	1.84	1.98	2.12	2.27	2.41

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-3
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 40 psf plus
Dead Load of 10 psf determines the required bending design value
Deflection - For 40 psf live load.
Limited to span in inches divided by 240

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																				
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
2x6	12.0	5 - 6	6 - 4	7 - 1	7 - 9	8 - 5	9 - 0	9 - 6	10 - 0	10 - 6	11 - 0	11 - 5	11 - 11	12 - 4	12 - 8	13 - 1	13 - 6	13 - 10	14 - 2	-	-	-	-
	16.0	4 - 9	5 - 6	6 - 2	6 - 9	7 - 3	7 - 9	8 - 3	8 - 8	9 - 1	9 - 6	9 - 11	10 - 3	10 - 8	11 - 0	11 - 4	11 - 8	12 - 0	12 - 4	12 - 7	12 - 11	-	-
	19.2	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4
	24.0	3 - 11	4 - 6	5 - 0	5 - 6	5 - 11	6 - 4	6 - 9	7 - 1	7 - 5	7 - 9	8 - 1	8 - 5	8 - 8	9 - 0	9 - 3	9 - 6	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	11 - 0
2x8	12.0	7 - 3	8 - 4	9 - 4	10 - 3	11 - 1	11 - 10	12 - 7	13 - 3	13 - 11	14 - 6	15 - 1	15 - 8	16 - 3	16 - 9	17 - 3	17 - 9	18 - 3	18 - 9	-	-	-	-
	16.0	6 - 3	7 - 3	8 - 1	8 - 11	9 - 7	10 - 3	10 - 11	11 - 6	12 - 0	12 - 7	13 - 1	13 - 7	14 - 0	14 - 6	14 - 11	15 - 5	15 - 10	16 - 3	16 - 7	17 - 0	-	-
	19.2	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3
	24.0	5 - 2	5 - 11	6 - 7	7 - 3	7 - 10	8 - 4	8 - 11	9 - 4	9 - 10	10 - 3	10 - 8	11 - 1	11 - 6	11 - 10	12 - 2	12 - 7	12 - 11	13 - 3	13 - 7	13 - 11	14 - 2	14 - 6
2x10	12.0	9 - 3	10 - 8	11 - 11	13 - 1	14 - 2	15 - 1	16 - 0	16 - 11	17 - 9	18 - 6	19 - 3	20 - 0	20 - 8	21 - 4	22 - 0	22 - 8	23 - 3	23 - 11	-	-	-	-
	16.0	8 - 0	9 - 3	10 - 4	11 - 4	12 - 3	13 - 1	13 - 11	14 - 8	15 - 4	16 - 0	16 - 8	17 - 4	17 - 11	18 - 6	19 - 1	19 - 7	20 - 2	20 - 8	21 - 2	21 - 8	-	-
	19.2	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8
	24.0	6 - 6	7 - 7	8 - 5	9 - 3	10 - 0	10 - 8	11 - 4	11 - 11	12 - 6	13 - 1	13 - 7	14 - 2	14 - 8	15 - 1	15 - 7	16 - 0	16 - 6	16 - 11	17 - 4	17 - 9	18 - 1	18 - 6
2x12	12.0	11 - 3	13 - 0	14 - 6	15 - 11	17 - 2	18 - 4	19 - 6	20 - 6	21 - 7	22 - 6	23 - 5	24 - 4	25 - 2	26 - 0	-	-	-	-	-	-	-	-
	16.0	9 - 9	11 - 3	12 - 7	13 - 9	14 - 11	15 - 11	16 - 11	17 - 9	18 - 8	19 - 6	20 - 3	21 - 1	21 - 9	22 - 6	23 - 2	23 - 10	24 - 6	25 - 2	25 - 9	-	-	-
	19.2	8 - 11	10 - 3	11 - 6	12 - 7	13 - 7	14 - 6	15 - 5	16 - 3	17 - 0	17 - 9	18 - 6	19 - 3	19 - 11	20 - 6	21 - 2	21 - 9	22 - 5	23 - 0	23 - 6	24 - 1	24 - 8	25 - 2
	24.0	7 - 11	9 - 2	10 - 3	11 - 3	12 - 2	13 - 0	13 - 9	14 - 6	15 - 3	15 - 11	16 - 7	17 - 2	17 - 9	18 - 4	18 - 11	19 - 6	20 - 0	20 - 6	21 - 1	21 - 7	22 - 0	22 - 6
E	12.0	0.14	0.22	0.31	0.41	0.51	0.63	0.75	0.88	1.01	1.15	1.30	1.45	1.61	1.77	1.94	2.12	2.30	2.48	-	-	-	-
	16.0	0.12	0.19	0.27	0.35	0.44	0.54	0.65	0.76	0.88	1.00	1.12	1.26	1.39	1.54	1.68	1.83	1.99	2.15	2.31	2.48	-	-
	19.2	0.11	0.18	0.24	0.32	0.41	0.50	0.59	0.69	0.80	0.91	1.03	1.15	1.27	1.40	1.54	1.67	1.81	1.96	2.11	2.26	2.42	2.58
	24.0	0.10	0.16	0.22	0.29	0.36	0.44	0.53	0.62	0.71	0.81	0.92	1.03	1.14	1.25	1.37	1.50	1.62	1.75	1.89	2.02	2.16	2.30

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-4
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 50 psf plus
Dead Load of 10 psf determines the required bending design value.
Deflection - For 50 psf live load
Limited to span in inches divided by 240

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																				
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
2x6	12.0	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	-	-	-
	16.0	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	-
	19.2	4 - 0	4 - 7	5 - 1	5 - 7	6 - 1	6 - 6	6 - 11	7 - 3	7 - 7	7 - 11	8 - 3	8 - 7	8 - 11	9 - 2	9 - 5	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	11 - 0	11 - 3
	24.0	3 - 7	4 - 1	4 - 7	5 - 0	5 - 5	5 - 10	6 - 2	6 - 6	6 - 10	7 - 1	7 - 5	7 - 8	7 - 11	8 - 2	8 - 5	8 - 8	8 - 11	9 - 2	9 - 5	9 - 7	9 - 10	10 - 0
2x8	12.0	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	-	-	-
	16.0	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	-
	19.2	5 - 3	6 - 1	6 - 9	7 - 5	8 - 0	8 - 7	9 - 1	9 - 7	10 - 0	10 - 6	10 - 11	11 - 4	11 - 8	12 - 1	12 - 5	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 6	14 - 10
	24.0	4 - 8	5 - 5	6 - 1	6 - 7	7 - 2	7 - 8	8 - 1	8 - 7	9 - 0	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 2	11 - 6	11 - 9	12 - 1	12 - 5	12 - 8	12 - 11	13 - 3
2x10	12.0	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	-	-	-
	16.0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	-
	19.2	6 - 8	7 - 9	8 - 7	9 - 5	10 - 2	10 - 11	11 - 7	12 - 2	12 - 9	13 - 4	13 - 11	14 - 5	14 - 11	15 - 5	15 - 11	16 - 4	16 - 10	17 - 3	17 - 8	18 - 1	18 - 6	18 - 11
	24.0	6 - 0	6 - 11	7 - 9	8 - 5	9 - 1	9 - 9	10 - 4	10 - 11	11 - 5	11 - 11	12 - 5	12 - 11	13 - 4	13 - 9	14 - 3	14 - 8	15 - 0	15 - 5	15 - 10	16 - 2	16 - 6	16 - 11
2x12	12.0	10 - 3	11 - 10	13 - 3	14 - 6	15 - 8	16 - 9	17 - 9	18 - 9	19 - 8	20 - 6	21 - 5	22 - 2	23 - 0	23 - 9	24 - 5	25 - 2	25 - 10	-	-	-	-	-
	16.0	8 - 11	10 - 3	11 - 6	12 - 7	13 - 7	14 - 6	15 - 5	16 - 3	17 - 0	17 - 9	18 - 6	19 - 3	19 - 11	20 - 6	21 - 2	21 - 9	22 - 5	23 - 0	23 - 6	24 - 1	24 - 8	-
	19.2	8 - 1	9 - 5	10 - 6	11 - 6	12 - 5	13 - 3	14 - 1	14 - 10	15 - 7	16 - 3	16 - 11	17 - 6	18 - 2	18 - 9	19 - 4	19 - 11	20 - 5	21 - 0	21 - 6	22 - 0	22 - 6	23 - 0
	24.0	7 - 3	8 - 5	9 - 5	10 - 3	11 - 1	11 - 10	12 - 7	13 - 3	13 - 11	14 - 6	15 - 1	15 - 8	16 - 3	16 - 9	17 - 3	17 - 9	18 - 3	18 - 9	19 - 3	19 - 8	20 - 1	20 - 6
E	12.0	0.14	0.21	0.29	0.39	0.49	0.60	0.71	0.83	0.96	1.10	1.24	1.38	1.53	1.69	1.85	2.01	2.18	2.36	2.54	-	-	-
	16.0	0.12	0.18	0.26	0.34	0.42	0.52	0.62	0.72	0.83	0.95	1.07	1.20	1.33	1.46	1.60	1.74	1.89	2.04	2.20	2.35	2.52	-
	19.2	0.11	0.17	0.23	0.31	0.39	0.47	0.56	0.66	0.76	0.87	0.98	1.09	1.21	1.33	1.46	1.59	1.73	1.86	2.00	2.15	2.30	2.45
	24.0	0.10	0.15	0.21	0.27	0.35	0.42	0.50	0.59	0.68	0.77	0.87	0.98	1.08	1.19	1.31	1.42	1.54	1.67	1.79	1.92	2.06	2.19

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-5
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 20 psf plus
Dead Load of 15 psf determines the required bending design value.
Deflection - For 20 psf live load.
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																								
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	6 - 7	7 - 7	8 - 6	9 - 4	10 - 0	10 - 9	11 - 5	12 - 0	12 - 7	13 - 2	13 - 8	14 - 2	14 - 8	15 - 2	15 - 8	16 - 1	16 - 7	17 - 0	17 - 5	17 - 10	-	-	-	-	-
	16.0	5 - 8	6 - 7	7 - 4	8 - 1	8 - 8	9 - 4	9 - 10	10 - 5	10 - 11	11 - 5	11 - 10	12 - 4	12 - 9	13 - 2	13 - 7	13 - 11	14 - 4	14 - 8	15 - 1	15 - 5	15 - 9	16 - 1	16 - 5	-	-
	19.2	5 - 2	6 - 0	6 - 9	7 - 4	7 - 11	8 - 6	9 - 0	9 - 6	9 - 11	10 - 5	10 - 10	11 - 3	11 - 7	12 - 0	12 - 4	12 - 9	13 - 1	13 - 5	13 - 9	14 - 1	14 - 5	14 - 8	15 - 0	15 - 4	-
	24.0	4 - 8	5 - 4	6 - 0	6 - 7	7 - 1	7 - 7	8 - 1	8 - 6	8 - 11	9 - 4	9 - 8	10 - 0	10 - 5	10 - 9	11 - 1	11 - 5	11 - 8	12 - 0	12 - 4	12 - 7	12 - 10	13 - 2	13 - 5	13 - 8	13 - 11
2x 8	12.0	8 - 8	10 - 0	11 - 2	12 - 3	13 - 3	14 - 2	15 - 0	15 - 10	16 - 7	17 - 4	18 - 0	18 - 9	19 - 5	20 - 0	20 - 8	21 - 3	21 - 10	22 - 4	22 - 11	23 - 6	-	-	-	-	-
	16.0	7 - 6	8 - 8	9 - 8	10 - 7	11 - 6	12 - 3	13 - 0	13 - 8	14 - 4	15 - 0	15 - 7	16 - 3	16 - 9	17 - 4	17 - 10	18 - 5	18 - 11	19 - 5	19 - 10	20 - 4	20 - 9	21 - 3	21 - 8	-	-
	19.2	6 - 10	7 - 11	8 - 10	9 - 8	10 - 6	11 - 2	11 - 10	12 - 6	13 - 1	13 - 8	14 - 3	14 - 10	15 - 4	15 - 10	16 - 4	16 - 9	17 - 3	17 - 8	18 - 2	18 - 7	19 - 0	19 - 5	19 - 9	20 - 2	-
	24.0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 4	10 - 0	10 - 7	11 - 2	11 - 9	12 - 3	12 - 9	13 - 3	13 - 8	14 - 2	14 - 7	15 - 0	15 - 5	15 - 10	16 - 3	16 - 7	17 - 0	17 - 4	17 - 8	18 - 0	18 - 5
2x10	12.0	11 - 1	12 - 9	14 - 3	15 - 8	16 - 11	18 - 1	19 - 2	20 - 2	21 - 2	22 - 1	23 - 0	23 - 11	24 - 9	25 - 6	-	-	-	-	-	-	-	-	-	-	-
	16.0	9 - 7	11 - 1	12 - 4	13 - 6	14 - 8	15 - 8	16 - 7	17 - 6	18 - 4	19 - 2	19 - 11	20 - 8	21 - 5	22 - 1	22 - 10	23 - 5	24 - 1	24 - 9	25 - 4	25 - 11	-	-	-	-	-
	19.2	8 - 9	10 - 1	11 - 3	12 - 4	13 - 4	14 - 3	15 - 2	15 - 11	16 - 9	17 - 6	18 - 2	18 - 11	19 - 7	20 - 2	20 - 10	21 - 5	22 - 0	22 - 7	23 - 2	23 - 8	24 - 2	24 - 9	25 - 3	25 - 9	-
	24.0	7 - 10	9 - 0	10 - 1	11 - 1	11 - 11	12 - 9	13 - 6	14 - 3	15 - 0	15 - 8	16 - 3	16 - 11	17 - 6	18 - 1	18 - 7	19 - 2	19 - 8	20 - 2	20 - 8	21 - 2	21 - 8	22 - 1	22 - 7	23 - 0	23 - 5
2x12	12.0	13 - 5	15 - 6	17 - 4	19 - 0	20 - 6	21 - 11	23 - 3	24 - 7	25 - 9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	11 - 8	13 - 5	15 - 0	16 - 6	17 - 9	19 - 0	20 - 2	21 - 3	22 - 4	23 - 3	24 - 3	25 - 2	26 - 0	-	-	-	-	-	-	-	-	-	-	-	-
	19.2	10 - 8	12 - 3	13 - 9	15 - 0	16 - 3	17 - 4	18 - 5	19 - 5	20 - 4	21 - 3	22 - 2	23 - 0	23 - 9	24 - 7	25 - 4	26 - 0	-	-	-	-	-	-	-	-	-
	24.0	9 - 6	11 - 0	12 - 3	13 - 5	14 - 6	15 - 6	16 - 6	17 - 4	18 - 2	19 - 0	19 - 10	20 - 6	21 - 3	21 - 11	22 - 8	23 - 3	23 - 11	24 - 7	25 - 2	25 - 9	-	-	-	-	-
E	12.0	0.12	0.19	0.26	0.35	0.44	0.54	0.64	0.75	0.86	0.98	1.11	1.24	1.37	1.51	1.66	1.81	1.96	2.12	2.28	2.44	-	-	-	-	-
	16.0	0.11	0.16	0.23	0.30	0.38	0.46	0.55	0.65	0.75	0.85	0.96	1.07	1.19	1.31	1.44	1.56	1.70	1.83	1.97	2.11	2.26	2.41	2.56	-	-
	19.2	0.10	0.15	0.21	0.27	0.35	0.42	0.51	0.59	0.68	0.78	0.88	0.98	1.09	1.20	1.31	1.43	1.55	1.67	1.80	1.93	2.06	2.20	2.34	2.48	-
	24.0	0.09	0.13	0.19	0.25	0.31	0.38	0.45	0.53	0.61	0.70	0.78	0.88	0.97	1.07	1.17	1.28	1.39	1.50	1.61	1.73	1.85	1.97	2.09	2.22	2.35

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-6
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 30 psf plus
Dead Load of 15 psf determines the required bending design value.
Deflection - For 30 psf live load
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																						
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	5 - 10	6 - 8	7 - 6	8 - 2	8 - 10	9 - 6	10 - 0	10 - 7	11 - 1	11 - 7	12 - 1	12 - 6	13 - 0	13 - 5	13 - 10	14 - 2	14 - 7	15 - 0	15 - 4	15 - 8	-	-	-	-	-
	16.0	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	13 - 7	13 - 11	14 - 2	-	-	-
	19.2	4 - 7	5 - 4	5 - 11	6 - 6	7 - 0	7 - 6	7 - 11	8 - 4	8 - 9	9 - 2	9 - 6	9 - 11	10 - 3	10 - 7	10 - 11	11 - 3	11 - 6	11 - 10	12 - 2	12 - 5	12 - 8	13 - 0	13 - 3	13 - 6	-
	24.0	4 - 1	4 - 9	5 - 4	5 - 10	6 - 3	6 - 8	7 - 1	7 - 6	7 - 10	8 - 2	8 - 6	8 - 10	9 - 2	9 - 6	9 - 9	10 - 0	10 - 4	10 - 7	10 - 10	11 - 1	11 - 4	11 - 7	11 - 10	12 - 1	12 - 4
2x 8	12.0	7 - 8	8 - 10	9 - 10	10 - 10	11 - 8	12 - 6	13 - 3	13 - 11	14 - 8	15 - 3	15 - 11	16 - 6	17 - 1	17 - 8	18 - 2	18 - 9	19 - 3	19 - 9	20 - 3	20 - 8	-	-	-	-	-
	16.0	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	17 - 11	18 - 4	18 - 9	-	-	-
	19.2	6 - 1	7 - 0	7 - 10	8 - 7	9 - 3	9 - 10	10 - 6	11 - 0	11 - 7	12 - 1	12 - 7	13 - 1	13 - 6	13 - 11	14 - 5	14 - 10	15 - 2	15 - 7	16 - 0	16 - 4	16 - 9	17 - 1	17 - 5	17 - 9	-
	24.0	5 - 5	6 - 3	7 - 0	7 - 8	8 - 3	8 - 10	9 - 4	9 - 10	10 - 4	10 - 10	11 - 3	11 - 8	12 - 1	12 - 6	12 - 10	13 - 3	13 - 7	13 - 11	14 - 4	14 - 8	15 - 0	15 - 3	15 - 7	15 - 11	16 - 3
2x10	12.0	9 - 9	11 - 3	12 - 7	13 - 9	14 - 11	15 - 11	16 - 11	17 - 10	18 - 8	19 - 6	20 - 4	21 - 1	21 - 10	22 - 6	23 - 3	23 - 11	24 - 6	25 - 2	25 - 10	-	-	-	-	-	-
	16.0	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	22 - 10	23 - 5	23 - 11	-	-	-
	19.2	7 - 9	8 - 11	9 - 11	10 - 11	11 - 9	12 - 7	13 - 4	14 - 1	14 - 9	15 - 5	16 - 1	16 - 8	17 - 3	17 - 10	18 - 4	18 - 11	19 - 5	19 - 11	20 - 5	20 - 10	21 - 4	21 - 10	22 - 3	22 - 8	-
	24.0	6 - 11	8 - 0	8 - 11	9 - 9	10 - 6	11 - 3	11 - 11	12 - 7	13 - 2	13 - 9	14 - 4	14 - 11	15 - 5	15 - 11	16 - 5	16 - 11	17 - 4	17 - 10	18 - 3	18 - 8	19 - 1	19 - 6	19 - 11	20 - 4	20 - 8
2x12	12.0	11 - 10	13 - 8	15 - 4	16 - 9	18 - 1	19 - 4	20 - 6	21 - 8	22 - 8	23 - 9	24 - 8	25 - 7	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	10 - 3	11 - 10	13 - 3	14 - 6	15 - 8	16 - 9	17 - 9	18 - 9	19 - 8	20 - 6	21 - 5	22 - 2	23 - 0	23 - 9	24 - 5	25 - 2	25 - 10	-	-	-	-	-	-	-	-
	19.2	9 - 5	10 - 10	12 - 1	13 - 3	14 - 4	15 - 4	16 - 3	17 - 1	17 - 11	18 - 9	19 - 6	20 - 3	21 - 0	21 - 8	22 - 4	23 - 0	23 - 7	24 - 2	24 - 10	25 - 5	25 - 11	-	-	-	-
	24.0	8 - 5	9 - 8	10 - 10	11 - 10	12 - 10	13 - 8	14 - 6	15 - 4	16 - 1	16 - 9	17 - 5	18 - 1	18 - 9	19 - 4	20 - 0	20 - 6	21 - 1	21 - 8	22 - 2	22 - 8	23 - 3	23 - 9	24 - 2	24 - 8	25 - 2
E	12.0	0.13	0.19	0.27	0.36	0.45	0.55	0.66	0.77	0.89	1.01	1.14	1.28	1.41	1.56	1.71	1.86	2.02	2.18	2.34	2.51	-	-	-	-	-
	16.0	0.11	0.17	0.24	0.31	0.39	0.48	0.57	0.67	0.77	0.88	0.99	1.10	1.22	1.35	1.48	1.61	1.75	1.89	2.03	2.18	2.33	2.48	-	-	-
	19.2	0.10	0.15	0.22	0.28	0.36	0.44	0.52	0.61	0.70	0.80	0.90	1.01	1.12	1.23	1.35	1.47	1.59	1.72	1.85	1.99	2.12	2.26	2.41	2.55	-
	24.0	0.09	0.14	0.19	0.25	0.32	0.39	0.46	0.54	0.63	0.72	0.81	0.90	1.00	1.10	1.21	1.31	1.43	1.54	1.66	1.78	1.90	2.02	2.15	2.28	2.41

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-7
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 40 psf plus
Dead Load of 15 psf determines the required bending design value.
Deflection - For 40 psf live load
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																							
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	5 - 3	6 - 1	6 - 9	7 - 5	8 - 0	8 - 7	9 - 1	9 - 7	10 - 0	10 - 6	10 - 11	11 - 4	11 - 9	12 - 1	12 - 6	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	-	-	-	-	-
	16.0	4 - 6	5 - 3	5 - 10	6 - 5	6 - 11	7 - 5	7 - 10	8 - 3	8 - 8	9 - 1	9 - 5	9 - 10	10 - 2	10 - 6	10 - 10	11 - 1	11 - 5	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1	-	-
	19.2	4 - 2	4 - 9	5 - 4	5 - 10	6 - 4	6 - 9	7 - 2	7 - 7	7 - 11	8 - 3	8 - 8	8 - 11	9 - 3	9 - 7	9 - 10	10 - 2	10 - 5	10 - 8	11 - 0	11 - 3	11 - 6	11 - 9	12 - 0	12 - 2	-
	24.0	3 - 8	4 - 3	4 - 9	5 - 3	5 - 8	6 - 1	6 - 5	6 - 9	7 - 1	7 - 5	7 - 9	8 - 0	8 - 3	8 - 7	8 - 10	9 - 1	9 - 4	9 - 7	9 - 10	10 - 0	10 - 3	10 - 6	10 - 8	10 - 11	11 - 1
2x 8	12.0	6 - 11	8 - 0	8 - 11	9 - 9	10 - 7	11 - 3	12 - 0	12 - 7	13 - 3	13 - 10	14 - 5	14 - 11	15 - 5	16 - 0	16 - 5	16 - 11	17 - 5	17 - 10	18 - 3	18 - 9	-	-	-	-	-
	16.0	6 - 0	6 - 11	7 - 9	8 - 6	9 - 2	9 - 9	10 - 4	10 - 11	11 - 6	12 - 0	12 - 6	12 - 11	13 - 5	13 - 10	14 - 3	14 - 8	15 - 1	15 - 5	15 - 10	16 - 3	16 - 7	16 - 11	17 - 3	-	-
	19.2	5 - 6	6 - 4	7 - 1	7 - 9	8 - 4	8 - 11	9 - 6	10 - 0	10 - 6	10 - 11	11 - 5	11 - 10	12 - 3	12 - 7	13 - 0	13 - 5	13 - 9	14 - 1	14 - 6	14 - 10	15 - 2	15 - 5	15 - 9	16 - 1	-
	24.0	4 - 11	5 - 8	6 - 4	6 - 11	7 - 6	8 - 0	8 - 6	8 - 11	9 - 4	9 - 9	10 - 2	10 - 7	10 - 11	11 - 3	11 - 8	12 - 0	12 - 4	12 - 7	12 - 11	13 - 3	13 - 6	13 - 10	14 - 1	14 - 5	14 - 8
2x10	12.0	8 - 10	10 - 2	11 - 5	12 - 6	13 - 6	14 - 5	15 - 3	16 - 1	16 - 11	17 - 8	18 - 4	19 - 1	19 - 9	20 - 4	21 - 0	21 - 7	22 - 2	22 - 9	23 - 4	23 - 11	-	-	-	-	-
	16.0	7 - 8	8 - 10	9 - 10	10 - 10	11 - 8	12 - 6	13 - 3	13 - 11	14 - 8	15 - 3	15 - 11	16 - 6	17 - 1	17 - 8	18 - 2	18 - 9	19 - 3	19 - 9	20 - 2	20 - 8	21 - 2	21 - 7	22 - 1	-	-
	19.2	7 - 0	8 - 1	9 - 0	9 - 10	10 - 8	11 - 5	12 - 1	12 - 9	13 - 4	13 - 11	14 - 6	15 - 1	15 - 7	16 - 1	16 - 7	17 - 1	17 - 7	18 - 0	18 - 5	18 - 11	19 - 4	19 - 9	20 - 2	20 - 6	-
	24.0	6 - 3	7 - 2	8 - 1	8 - 10	9 - 6	10 - 2	10 - 10	11 - 5	11 - 11	12 - 6	13 - 0	13 - 6	13 - 11	14 - 5	14 - 10	15 - 3	15 - 8	16 - 1	16 - 6	16 - 11	17 - 3	17 - 8	18 - 0	18 - 4	18 - 9
2x12	12.0	10 - 9	12 - 5	13 - 10	15 - 2	16 - 5	17 - 6	18 - 7	19 - 7	20 - 6	21 - 5	22 - 4	23 - 2	24 - 0	24 - 9	25 - 6	-	-	-	-	-	-	-	-	-	-
	16.0	9 - 3	10 - 9	12 - 0	13 - 2	14 - 2	15 - 2	16 - 1	17 - 0	17 - 9	18 - 7	19 - 4	20 - 1	20 - 9	21 - 5	22 - 1	22 - 9	23 - 5	24 - 0	24 - 7	25 - 2	25 - 9	-	-	-	-
	19.2	8 - 6	9 - 10	10 - 11	12 - 0	12 - 11	13 - 10	14 - 8	15 - 6	16 - 3	17 - 0	17 - 8	18 - 4	19 - 0	19 - 7	20 - 2	20 - 9	21 - 4	21 - 11	22 - 5	23 - 0	23 - 6	24 - 0	24 - 6	25 - 0	-
	24.0	7 - 7	8 - 9	9 - 10	10 - 9	11 - 7	12 - 5	13 - 2	13 - 10	14 - 6	15 - 2	15 - 9	16 - 5	17 - 0	17 - 6	18 - 1	18 - 7	19 - 1	19 - 7	20 - 1	20 - 6	21 - 0	21 - 5	21 - 11	22 - 4	22 - 9
E	12.0	0.12	0.19	0.27	0.35	0.44	0.54	0.65	0.76	0.88	1.00	1.13	1.26	1.40	1.54	1.68	1.83	1.99	2.15	2.31	2.48	-	-	-	-	-
	16.0	0.11	0.17	0.23	0.31	0.39	0.47	0.56	0.66	0.76	0.86	0.98	1.09	1.21	1.33	1.46	1.59	1.72	1.86	2.00	2.15	2.29	2.45	2.60	-	-
	19.2	0.10	0.15	0.21	0.28	0.35	0.43	0.51	0.60	0.69	0.79	0.89	0.99	1.10	1.22	1.33	1.45	1.57	1.70	1.83	1.96	2.09	2.23	2.37	2.52	-
	24.0	0.09	0.14	0.19	0.25	0.31	0.38	0.46	0.54	0.62	0.71	0.80	0.89	0.99	1.09	1.19	1.30	1.41	1.52	1.63	1.75	1.87	2.00	2.12	2.25	2.38

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-8
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 50 psf plus
Dead Load of 15 psf determines the required bending design value.
Deflection - For 50 psf live load.
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																							
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	4 - 10	5 - 7	6 - 3	6 - 10	7 - 4	7 - 11	8 - 4	8 - 10	9 - 3	9 - 8	10 - 0	10 - 5	10 - 9	11 - 2	11 - 6	11 - 10	12 - 2	12 - 5	12 - 9	13 - 1	13 - 4	-	-	-	-
	16.0	4 - 2	4 - 10	5 - 5	5 - 11	6 - 5	6 - 10	7 - 3	7 - 8	8 - 0	8 - 4	8 - 8	9 - 0	9 - 4	9 - 8	9 - 11	10 - 3	10 - 6	10 - 9	11 - 1	11 - 4	11 - 7	11 - 10	12 - 1	-	-
	19.2	3 - 10	4 - 5	4 - 11	5 - 5	5 - 10	6 - 3	6 - 7	7 - 0	7 - 4	7 - 8	7 - 11	8 - 3	8 - 6	8 - 10	9 - 1	9 - 4	9 - 7	9 - 10	10 - 1	10 - 4	10 - 7	10 - 9	11 - 0	11 - 3	11 - 5
	24.0	3 - 5	3 - 11	4 - 5	4 - 10	5 - 3	5 - 7	5 - 11	6 - 3	6 - 6	6 - 10	7 - 1	7 - 4	7 - 8	7 - 11	8 - 1	8 - 4	8 - 7	8 - 10	9 - 0	9 - 3	9 - 5	9 - 8	9 - 10	10 - 0	10 - 3
2x 8	12.0	6 - 4	7 - 4	8 - 3	9 - 0	9 - 9	10 - 5	11 - 0	11 - 7	12 - 2	12 - 9	13 - 3	13 - 9	14 - 3	14 - 8	15 - 2	15 - 7	16 - 0	16 - 5	16 - 10	17 - 3	17 - 7	-	-	-	-
	16.0	5 - 6	6 - 4	7 - 1	7 - 9	8 - 5	9 - 0	9 - 6	10 - 1	10 - 7	11 - 0	11 - 6	11 - 11	12 - 4	12 - 9	13 - 1	13 - 6	13 - 10	14 - 3	14 - 7	14 - 11	15 - 3	15 - 7	15 - 11	-	-
	19.2	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 3	8 - 8	9 - 2	9 - 8	10 - 1	10 - 6	10 - 10	11 - 3	11 - 7	12 - 0	12 - 4	12 - 8	13 - 0	13 - 4	13 - 7	13 - 11	14 - 3	14 - 6	14 - 10	15 - 1
	24.0	4 - 6	5 - 2	5 - 10	6 - 4	6 - 10	7 - 4	7 - 9	8 - 3	8 - 7	9 - 0	9 - 4	9 - 9	10 - 1	10 - 5	10 - 8	11 - 0	11 - 4	11 - 7	11 - 11	12 - 2	12 - 5	12 - 9	13 - 0	13 - 3	13 - 6
2x10	12.0	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 1	14 - 10	15 - 6	16 - 3	16 - 11	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	21 - 6	22 - 0	22 - 6	-	-	-	-
	16.0	7 - 0	8 - 1	9 - 1	9 - 11	10 - 9	11 - 6	12 - 2	12 - 10	13 - 5	14 - 1	14 - 8	15 - 2	15 - 9	16 - 3	16 - 9	17 - 3	17 - 8	18 - 2	18 - 7	19 - 0	19 - 5	19 - 10	20 - 3	-	-
	19.2	6 - 5	7 - 5	8 - 3	9 - 1	9 - 10	10 - 6	11 - 1	11 - 9	12 - 3	12 - 10	13 - 4	13 - 10	14 - 4	14 - 10	15 - 3	15 - 9	16 - 2	16 - 7	17 - 0	17 - 4	17 - 9	18 - 2	18 - 6	18 - 11	19 - 3
	24.0	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 1	14 - 5	14 - 10	15 - 2	15 - 6	15 - 11	16 - 3	16 - 7	16 - 11	17 - 3
2x12	12.0	9 - 10	11 - 5	12 - 9	13 - 11	15 - 1	16 - 1	17 - 1	18 - 0	18 - 11	19 - 9	20 - 6	21 - 4	22 - 1	22 - 9	23 - 6	24 - 2	24 - 10	25 - 6	-	-	-	-	-	-	-
	16.0	8 - 7	9 - 10	11 - 0	12 - 1	13 - 1	13 - 11	14 - 10	15 - 7	16 - 4	17 - 1	17 - 9	18 - 6	19 - 1	19 - 9	20 - 4	20 - 11	21 - 6	22 - 1	22 - 7	23 - 2	23 - 8	24 - 2	24 - 8	-	-
	19.2	7 - 10	9 - 0	10 - 1	11 - 0	11 - 11	12 - 9	13 - 6	14 - 3	14 - 11	15 - 7	16 - 3	16 - 10	17 - 5	18 - 0	18 - 7	19 - 1	19 - 8	20 - 2	20 - 8	21 - 1	21 - 7	22 - 1	22 - 6	23 - 0	23 - 5
	24.0	7 - 0	8 - 1	9 - 0	9 - 10	10 - 8	11 - 5	12 - 1	12 - 9	13 - 4	13 - 11	14 - 6	15 - 1	15 - 7	16 - 1	16 - 7	17 - 1	17 - 7	18 - 0	18 - 6	18 - 11	19 - 4	19 - 9	20 - 2	20 - 6	20 - 11
E	12.0	0.12	0.19	0.26	0.34	0.43	0.53	0.63	0.74	0.85	0.97	1.10	1.22	1.36	1.50	1.64	1.78	1.94	2.09	2.25	2.41	2.58	-	-	-	-
	16.0	0.11	0.16	0.23	0.30	0.37	0.46	0.55	0.64	0.74	0.84	0.95	1.06	1.18	1.30	1.42	1.55	1.68	1.81	1.95	2.09	2.23	2.38	2.53	-	-
	19.2	0.10	0.15	0.21	0.27	0.34	0.42	0.50	0.58	0.67	0.77	0.87	0.97	1.07	1.18	1.30	1.41	1.53	1.65	1.78	1.91	2.04	2.17	2.31	2.45	2.59
	24.0	0.09	0.13	0.18	0.24	0.31	0.37	0.45	0.52	0.60	0.69	0.77	0.87	0.96	1.06	1.16	1.26	1.37	1.48	1.59	1.71	1.82	1.94	2.07	2.19	2.32

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-9
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 20 psf plus
Dead Load of 20 psf determines the required bending design value.
Deflection - For 20 psf live load.
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																							
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 5	10 - 0	10 - 8	11 - 3	11 - 9	12 - 4	12 - 10	13 - 3	13 - 9	14 - 2	14 - 8	15 - 1	15 - 6	15 - 11	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	-
	16.0	5 - 4	6 - 2	6 - 11	7 - 6	8 - 2	8 - 8	9 - 3	9 - 9	10 - 2	10 - 8	11 - 1	11 - 6	11 - 11	12 - 4	12 - 8	13 - 1	13 - 5	13 - 9	14 - 1	14 - 5	14 - 9	15 - 1	15 - 4	15 - 8	16 - 0
	19.2	4 - 10	5 - 7	6 - 3	6 - 11	7 - 5	7 - 11	8 - 5	8 - 11	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 3	11 - 7	11 - 11	12 - 3	12 - 7	12 - 10	13 - 2	13 - 6	13 - 9	14 - 0	14 - 4	14 - 7
	24.0	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1
2x 8	12.0	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 0	14 - 10	15 - 6	16 - 3	16 - 10	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	21 - 5	21 - 11	22 - 5	22 - 11	23 - 5	23 - 10	-
	16.0	7 - 0	8 - 1	9 - 1	9 - 11	10 - 9	11 - 6	12 - 2	12 - 10	13 - 5	14 - 0	14 - 7	15 - 2	15 - 8	16 - 3	16 - 9	17 - 2	17 - 8	18 - 2	18 - 7	19 - 0	19 - 5	19 - 10	20 - 3	20 - 8	21 - 1
	19.2	6 - 5	7 - 5	8 - 3	9 - 1	9 - 9	10 - 6	11 - 1	11 - 8	12 - 3	12 - 10	13 - 4	13 - 10	14 - 4	14 - 10	15 - 3	15 - 8	16 - 2	16 - 7	16 - 11	17 - 4	17 - 9	18 - 2	18 - 6	18 - 10	19 - 3
	24.0	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3	16 - 7	16 - 10	17 - 2
2x10	12.0	10 - 4	11 - 11	13 - 4	14 - 8	15 - 10	16 - 11	17 - 11	18 - 11	19 - 10	20 - 8	21 - 6	22 - 4	23 - 2	23 - 11	24 - 7	25 - 4	26 - 0	-	-	-	-	-	-	-	-
	16.0	8 - 11	10 - 4	11 - 7	12 - 8	13 - 8	14 - 8	15 - 6	16 - 4	17 - 2	17 - 11	18 - 8	19 - 4	20 - 0	20 - 8	21 - 4	21 - 11	22 - 6	23 - 2	23 - 8	24 - 3	24 - 10	25 - 4	25 - 10	-	-
	19.2	8 - 2	9 - 5	10 - 7	11 - 7	12 - 6	13 - 4	14 - 2	14 - 11	15 - 8	16 - 4	17 - 0	17 - 8	18 - 3	18 - 11	19 - 6	20 - 0	20 - 7	21 - 1	21 - 8	22 - 2	22 - 8	23 - 2	23 - 7	24 - 1	24 - 6
	24.0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 11
2x12	12.0	12 - 7	14 - 6	16 - 3	17 - 9	19 - 3	20 - 6	21 - 9	23 - 0	24 - 1	25 - 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	10 - 11	12 - 7	14 - 1	15 - 5	16 - 8	17 - 9	18 - 10	19 - 11	20 - 10	21 - 9	22 - 8	23 - 6	24 - 4	25 - 2	25 - 11	-	-	-	-	-	-	-	-	-	-
	19.2	9 - 11	11 - 6	12 - 10	14 - 1	15 - 2	16 - 3	17 - 3	18 - 2	19 - 0	19 - 11	20 - 8	21 - 6	22 - 3	23 - 0	23 - 8	24 - 4	25 - 0	25 - 8	-	-	-	-	-	-	-
	24.0	8 - 11	10 - 3	11 - 6	12 - 7	13 - 7	14 - 6	15 - 5	16 - 3	17 - 0	17 - 9	18 - 6	19 - 3	19 - 11	20 - 6	21 - 2	21 - 9	22 - 5	23 - 0	23 - 6	24 - 1	24 - 8	25 - 2	25 - 8	-	-
E	12.0	0.10	0.15	0.22	0.28	0.36	0.44	0.52	0.61	0.71	0.80	0.91	1.01	1.13	1.24	1.36	1.48	1.60	1.73	1.86	2.00	2.14	2.28	2.42	2.57	-
	16.0	0.09	0.13	0.19	0.25	0.31	0.38	0.45	0.53	0.61	0.70	0.79	0.88	0.97	1.07	1.18	1.28	1.39	1.50	1.61	1.73	1.85	1.97	2.10	2.22	2.35
	19.2	0.08	0.12	0.17	0.23	0.28	0.35	0.41	0.48	0.56	0.64	0.72	0.80	0.89	0.98	1.07	1.17	1.27	1.37	1.47	1.58	1.69	1.80	1.91	2.03	2.15
	24.0	0.07	0.11	0.15	0.20	0.25	0.31	0.37	0.43	0.50	0.57	0.64	0.72	0.80	0.88	0.96	1.05	1.13	1.22	1.32	1.41	1.51	1.61	1.71	1.82	1.92

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-10
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 30 psf plus
Dead Load of 20 psf determines the required bending design value
Deflection - For 30 psf live load.
Limited to span in inches divided by 240

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																							
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	5 - 6	6 - 4	7 - 1	7 - 9	8 - 5	9 - 0	9 - 6	10 - 0	10 - 6	11 - 0	11 - 5	11 - 11	12 - 4	12 - 8	13 - 1	13 - 6	13 - 10	14 - 2	14 - 7	14 - 11	15 - 3	15 - 7	15 - 11	-	-
	16.0	4 - 9	5 - 6	6 - 2	6 - 9	7 - 3	7 - 9	8 - 3	8 - 8	9 - 1	9 - 6	9 - 11	10 - 3	10 - 8	11 - 0	11 - 4	11 - 8	12 - 0	12 - 4	12 - 7	12 - 11	13 - 2	13 - 6	13 - 9	14 - 0	14 - 3
	19.2	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1
	24.0	3 - 11	4 - 6	5 - 0	5 - 6	5 - 11	6 - 4	6 - 9	7 - 1	7 - 5	7 - 9	8 - 1	8 - 5	8 - 8	9 - 0	9 - 3	9 - 6	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8
2x 8	12.0	7 - 3	8 - 4	9 - 4	10 - 3	11 - 1	11 - 10	12 - 7	13 - 3	13 - 11	14 - 6	15 - 1	15 - 8	16 - 3	16 - 9	17 - 3	17 - 9	18 - 3	18 - 9	19 - 2	19 - 8	20 - 1	20 - 6	20 - 11	-	-
	16.0	6 - 3	7 - 3	8 - 1	8 - 11	9 - 7	10 - 3	10 - 11	11 - 6	12 - 0	12 - 7	13 - 1	13 - 7	14 - 0	14 - 6	14 - 11	15 - 5	15 - 10	16 - 3	16 - 7	17 - 0	17 - 5	17 - 9	18 - 2	18 - 6	18 - 10
	19.2	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3	16 - 7	16 - 10	17 - 2
	24.0	5 - 2	5 - 11	6 - 7	7 - 3	7 - 10	8 - 4	8 - 11	9 - 4	9 - 10	10 - 3	10 - 8	11 - 1	11 - 6	11 - 10	12 - 2	12 - 7	12 - 11	13 - 3	13 - 7	13 - 11	14 - 2	14 - 6	14 - 10	15 - 1	15 - 5
2x10	12.0	9 - 3	10 - 8	11 - 11	13 - 1	14 - 2	15 - 1	16 - 0	16 - 11	17 - 9	18 - 6	19 - 3	20 - 0	20 - 8	21 - 4	22 - 0	22 - 8	23 - 3	23 - 11	24 - 6	25 - 1	25 - 7	-	-	-	-
	16.0	8 - 0	9 - 3	10 - 4	11 - 4	12 - 3	13 - 1	13 - 11	14 - 8	15 - 4	16 - 0	16 - 8	17 - 4	17 - 11	18 - 6	19 - 1	19 - 7	20 - 2	20 - 8	21 - 2	21 - 8	22 - 2	22 - 8	23 - 2	23 - 7	24 - 0
	19.2	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 11
	24.0	6 - 6	7 - 7	8 - 5	9 - 3	10 - 0	10 - 8	11 - 4	11 - 11	12 - 6	13 - 1	13 - 7	14 - 2	14 - 8	15 - 1	15 - 7	16 - 0	16 - 6	16 - 11	17 - 4	17 - 9	18 - 1	18 - 6	18 - 11	19 - 3	19 - 7
2x12	12.0	11 - 3	13 - 0	14 - 6	15 - 11	17 - 2	18 - 4	19 - 6	20 - 6	21 - 7	22 - 6	23 - 5	24 - 4	25 - 2	26 - 0	-	-	-	-	-	-	-	-	-	-	-
	16.0	9 - 9	11 - 3	12 - 7	13 - 9	14 - 11	15 - 11	16 - 11	17 - 9	18 - 8	19 - 6	20 - 3	21 - 1	21 - 9	22 - 6	23 - 2	23 - 10	24 - 6	25 - 2	25 - 9	-	-	-	-	-	-
	19.2	8 - 11	10 - 3	11 - 6	12 - 7	13 - 7	14 - 6	15 - 5	16 - 3	17 - 0	17 - 9	18 - 6	19 - 3	19 - 11	20 - 6	21 - 2	21 - 9	22 - 5	23 - 0	23 - 6	24 - 1	24 - 8	25 - 2	25 - 8	-	-
	24.0	7 - 11	9 - 2	10 - 3	11 - 3	12 - 2	13 - 0	13 - 9	14 - 6	15 - 3	15 - 11	16 - 7	17 - 2	17 - 9	18 - 4	18 - 11	19 - 6	20 - 0	20 - 6	21 - 1	21 - 7	22 - 0	22 - 6	23 - 0	23 - 5	23 - 10
E	12.0	0.11	0.17	0.23	0.31	0.38	0.47	0.56	0.66	0.76	0.86	0.97	1.09	1.21	1.33	1.46	1.59	1.72	1.86	2.00	2.14	2.29	2.44	2.60	-	-
	16.0	0.09	0.14	0.20	0.26	0.33	0.41	0.49	0.57	0.66	0.75	0.84	0.94	1.05	1.15	1.26	1.37	1.49	1.61	1.73	1.86	1.99	2.12	2.25	2.39	2.53
	19.2	0.09	0.13	0.18	0.24	0.30	0.37	0.44	0.52	0.60	0.68	0.77	0.86	0.95	1.05	1.15	1.25	1.36	1.47	1.58	1.70	1.81	1.93	2.05	2.18	2.31
	24.0	0.08	0.12	0.16	0.22	0.27	0.33	0.40	0.46	0.54	0.61	0.69	0.77	0.85	0.94	1.03	1.12	1.22	1.31	1.41	1.52	1.62	1.73	1.84	1.95	2.06

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-11
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 40 psf plus
Dead Load of 20 psf determines the required bending design value.
Deflection - For 40 psf live load
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																							
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	13 - 7	13 - 11	14 - 2	-	-	-
	16.0	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1
	19.2	4 - 0	4 - 7	5 - 1	5 - 7	6 - 1	6 - 6	6 - 11	7 - 3	7 - 7	7 - 11	8 - 3	8 - 7	8 - 11	9 - 2	9 - 5	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	11 - 0	11 - 3	11 - 6	11 - 8	11 - 11
	24.0	3 - 7	4 - 1	4 - 7	5 - 0	5 - 5	5 - 10	6 - 2	6 - 6	6 - 10	7 - 1	7 - 5	7 - 8	7 - 11	8 - 2	8 - 5	8 - 8	8 - 11	9 - 2	9 - 5	9 - 7	9 - 10	10 - 0	10 - 3	10 - 5	10 - 8
2x 8	12.0	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	17 - 11	18 - 4	18 - 9	-	-	-
	16.0	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3	16 - 7	16 - 10	17 - 2
	19.2	5 - 3	6 - 1	6 - 9	7 - 5	8 - 0	8 - 7	9 - 1	9 - 7	10 - 0	10 - 6	10 - 11	11 - 4	11 - 8	12 - 1	12 - 5	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 6	14 - 10	15 - 1	15 - 5	15 - 8
	24.0	4 - 8	5 - 5	6 - 1	6 - 7	7 - 2	7 - 8	8 - 1	8 - 7	9 - 0	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 2	11 - 6	11 - 9	12 - 1	12 - 5	12 - 8	12 - 11	13 - 3	13 - 6	13 - 9	14 - 0
2x10	12.0	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	22 - 10	23 - 5	23 - 11	-	-	-
	16.0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 11
	19.2	6 - 8	7 - 9	8 - 7	9 - 5	10 - 2	10 - 11	11 - 7	12 - 2	12 - 9	13 - 4	13 - 11	14 - 5	14 - 11	15 - 5	15 - 11	16 - 4	16 - 10	17 - 3	17 - 8	18 - 1	18 - 6	18 - 11	19 - 3	19 - 8	20 - 0
	24.0	6 - 0	6 - 11	7 - 9	8 - 5	9 - 1	9 - 9	10 - 4	10 - 11	11 - 5	11 - 11	12 - 5	12 - 11	13 - 4	13 - 9	14 - 3	14 - 8	15 - 0	15 - 5	15 - 10	16 - 2	16 - 6	16 - 11	17 - 3	17 - 7	17 - 11
2x12	12.0	10 - 3	11 - 10	13 - 3	14 - 6	15 - 8	16 - 9	17 - 9	18 - 9	19 - 8	20 - 6	21 - 5	22 - 2	23 - 0	23 - 9	24 - 5	25 - 2	25 - 10	-	-	-	-	-	-	-	-
	16.0	8 - 11	10 - 3	11 - 6	12 - 7	13 - 7	14 - 6	15 - 5	16 - 3	17 - 0	17 - 9	18 - 6	19 - 3	19 - 11	20 - 6	21 - 2	21 - 9	22 - 5	23 - 0	23 - 6	24 - 1	24 - 8	25 - 2	25 - 8	-	-
	19.2	8 - 1	9 - 5	10 - 6	11 - 6	12 - 5	13 - 3	14 - 1	14 - 10	15 - 7	16 - 3	16 - 11	17 - 6	18 - 2	18 - 9	19 - 4	19 - 11	20 - 5	21 - 0	21 - 6	22 - 0	22 - 6	23 - 0	23 - 5	23 - 11	24 - 4
	24.0	7 - 3	8 - 5	9 - 5	10 - 3	11 - 1	11 - 10	12 - 7	13 - 3	13 - 11	14 - 6	15 - 1	15 - 8	16 - 3	16 - 9	17 - 3	17 - 9	18 - 3	18 - 9	19 - 3	19 - 8	20 - 1	20 - 6	21 - 0	21 - 5	21 - 9
E	12.0	0.11	0.17	0.24	0.31	0.39	0.48	0.57	0.67	0.77	0.88	0.99	1.10	1.22	1.35	1.48	1.61	1.75	1.89	2.03	2.18	2.33	2.48	-	-	-
	16.0	0.09	0.15	0.20	0.27	0.34	0.41	0.49	0.58	0.67	0.76	0.86	0.96	1.06	1.17	1.28	1.39	1.51	1.63	1.76	1.88	2.01	2.15	2.28	2.42	2.56
	19.2	0.09	0.13	0.19	0.24	0.31	0.38	0.45	0.53	0.61	0.69	0.78	0.87	0.97	1.07	1.17	1.27	1.38	1.49	1.60	1.72	1.84	1.96	2.08	2.21	2.34
	24.0	0.08	0.12	0.17	0.22	0.28	0.34	0.40	0.47	0.54	0.62	0.70	0.78	0.87	0.95	1.04	1.14	1.23	1.33	1.43	1.54	1.64	1.75	1.86	1.98	2.09

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-12
RAFTERS WITH L/240 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 50 psf plus
Dead Load of 20 psf determines the required bending design value
Deflection - For 50 psf live load.
Limited to span in inches divided by 240.

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																							
		300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
2x 6	12.0	4 - 8	5 - 4	6 - 0	6 - 7	7 - 1	7 - 7	8 - 1	8 - 6	8 - 11	9 - 4	9 - 8	10 - 0	10 - 5	10 - 9	11 - 1	11 - 5	11 - 8	12 - 0	12 - 4	12 - 7	12 - 10	13 - 2	-	-	-
	16.0	4 - 0	4 - 8	5 - 2	5 - 8	6 - 2	6 - 7	7 - 0	7 - 4	7 - 9	8 - 1	8 - 5	8 - 8	9 - 0	9 - 4	9 - 7	9 - 10	10 - 2	10 - 5	10 - 8	10 - 11	11 - 2	11 - 5	11 - 7	11 - 10	12 - 1
	19.2	3 - 8	4 - 3	4 - 9	5 - 2	5 - 7	6 - 0	6 - 4	6 - 9	7 - 0	7 - 4	7 - 8	7 - 11	8 - 3	8 - 6	8 - 9	9 - 0	9 - 3	9 - 6	9 - 9	9 - 11	10 - 2	10 - 5	10 - 7	10 - 10	11 - 0
	24.0	3 - 3	3 - 10	4 - 3	4 - 8	5 - 0	5 - 4	5 - 8	6 - 0	6 - 4	6 - 7	6 - 10	7 - 1	7 - 4	7 - 7	7 - 10	8 - 1	8 - 3	8 - 6	8 - 8	8 - 11	9 - 1	9 - 4	9 - 6	9 - 8	9 - 10
2x 8	12.0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 4	10 - 0	10 - 7	11 - 2	11 - 9	12 - 3	12 - 9	13 - 3	13 - 8	14 - 2	14 - 7	15 - 0	15 - 5	15 - 10	16 - 3	16 - 7	17 - 0	17 - 4	-	-	-
	16.0	5 - 4	6 - 2	6 - 10	7 - 6	8 - 1	8 - 8	9 - 2	9 - 8	10 - 2	10 - 7	11 - 1	11 - 6	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 8	15 - 0	15 - 4	15 - 7	15 - 11
	19.2	4 - 10	5 - 7	6 - 3	6 - 10	7 - 5	7 - 11	8 - 5	8 - 10	9 - 3	9 - 8	10 - 1	10 - 6	10 - 10	11 - 2	11 - 6	11 - 10	12 - 2	12 - 6	12 - 10	13 - 1	13 - 5	13 - 8	14 - 0	14 - 3	14 - 6
	24.0	4 - 4	5 - 0	5 - 7	6 - 2	6 - 7	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 0	9 - 4	9 - 8	10 - 0	10 - 4	10 - 7	10 - 11	11 - 2	11 - 6	11 - 9	12 - 0	12 - 3	12 - 6	12 - 9	13 - 0
2x10	12.0	7 - 10	9 - 0	10 - 1	11 - 1	11 - 11	12 - 9	13 - 6	14 - 3	15 - 0	15 - 8	16 - 3	16 - 11	17 - 6	18 - 1	18 - 7	19 - 2	19 - 8	20 - 2	20 - 8	21 - 2	21 - 8	22 - 1	-	-	-
	16.0	6 - 9	7 - 10	8 - 9	9 - 7	10 - 4	11 - 1	11 - 9	12 - 4	13 - 0	13 - 6	14 - 1	14 - 8	15 - 2	15 - 8	16 - 1	16 - 7	17 - 0	17 - 6	17 - 11	18 - 4	18 - 9	19 - 2	19 - 7	19 - 11	20 - 4
	19.2	6 - 2	7 - 2	8 - 0	8 - 9	9 - 5	10 - 1	10 - 8	11 - 3	11 - 10	12 - 4	12 - 10	13 - 4	13 - 10	14 - 3	14 - 9	15 - 2	15 - 7	15 - 11	16 - 4	16 - 9	17 - 1	17 - 6	17 - 10	18 - 2	18 - 6
	24.0	5 - 6	6 - 5	7 - 2	7 - 10	8 - 5	9 - 0	9 - 7	10 - 1	10 - 7	11 - 1	11 - 6	11 - 11	12 - 4	12 - 9	13 - 2	13 - 6	13 - 11	14 - 3	14 - 8	15 - 0	15 - 4	15 - 8	15 - 11	16 - 3	16 - 7
2x12	12.0	9 - 6	11 - 0	12 - 3	13 - 5	14 - 6	15 - 6	16 - 6	17 - 4	18 - 2	19 - 0	19 - 10	20 - 6	21 - 3	21 - 11	22 - 8	23 - 3	23 - 11	24 - 7	25 - 2	25 - 9	-	-	-	-	-
	16.0	8 - 3	9 - 6	10 - 8	11 - 8	12 - 7	13 - 5	14 - 3	15 - 0	15 - 9	16 - 6	17 - 2	17 - 9	18 - 5	19 - 0	19 - 7	20 - 2	20 - 9	21 - 3	21 - 9	22 - 4	22 - 10	23 - 3	23 - 9	24 - 3	24 - 8
	19.2	7 - 6	8 - 8	9 - 8	10 - 8	11 - 6	12 - 3	13 - 0	13 - 9	14 - 5	15 - 0	15 - 8	16 - 3	16 - 10	17 - 4	17 - 11	18 - 5	18 - 11	19 - 5	19 - 11	20 - 4	20 - 10	21 - 3	21 - 8	22 - 2	22 - 7
	24.0	6 - 9	7 - 9	8 - 8	9 - 6	10 - 3	11 - 0	11 - 8	12 - 3	12 - 10	13 - 5	14 - 0	14 - 6	15 - 0	15 - 6	16 - 0	16 - 6	16 - 11	17 - 4	17 - 9	18 - 2	18 - 7	19 - 0	19 - 5	19 - 10	20 - 2
E	12.0	0.11	0.17	0.23	0.31	0.39	0.47	0.56	0.66	0.76	0.87	0.98	1.10	1.21	1.34	1.47	1.60	1.73	1.87	2.01	2.16	2.31	2.46	-	-	-
	16.0	0.09	0.14	0.20	0.27	0.34	0.41	0.49	0.57	0.66	0.75	0.85	0.95	1.05	1.16	1.27	1.38	1.50	1.62	1.74	1.87	2.00	2.13	2.26	2.40	2.54
	19.2	0.09	0.13	0.18	0.24	0.31	0.37	0.45	0.52	0.60	0.69	0.77	0.87	0.96	1.06	1.16	1.26	1.37	1.48	1.59	1.71	1.82	1.94	2.07	2.19	2.32
	24.0	0.08	0.12	0.17	0.22	0.27	0.33	0.40	0.47	0.54	0.61	0.69	0.77	0.86	0.95	1.04	1.13	1.22	1.32	1.42	1.53	1.63	1.74	1.85	1.96	2.07

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'

TABLE R-13
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA:
Strength - Live load of 20 psf plus
Dead Load of 10 psf determines the required bending design value
Deflection - For 20 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																											
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12.0	3 - 8	4 - 6	5 - 3	5 - 10	6 - 5	6 - 11	7 - 5	7 - 10	8 - 3	8 - 8	9 - 0	9 - 5	9 - 9	10 - 1	10 - 5	10 - 9	11 - 1	11 - 4	11 - 8	11 - 11	12 - 3	12 - 6	-	-	-	-	-	-	-
	16.0	3 - 2	3 - 11	4 - 6	5 - 1	5 - 6	6 - 0	6 - 5	6 - 9	7 - 2	7 - 6	7 - 10	8 - 2	8 - 5	8 - 9	9 - 0	9 - 4	9 - 7	9 - 10	10 - 1	10 - 4	10 - 7	10 - 10	11 - 1	11 - 4	11 - 6	-	-	-	-
	19.2	2 - 11	3 - 7	4 - 1	4 - 7	5 - 1	5 - 5	5 - 10	6 - 2	6 - 6	6 - 10	7 - 2	7 - 5	7 - 9	8 - 0	8 - 3	8 - 6	8 - 9	9 - 0	9 - 3	9 - 5	9 - 8	9 - 11	10 - 1	10 - 4	10 - 6	10 - 9	-	-	-
	24.0	2 - 7	3 - 2	3 - 8	4 - 1	4 - 6	4 - 11	5 - 3	5 - 6	5 - 10	6 - 1	6 - 5	6 - 8	6 - 11	7 - 2	7 - 5	7 - 7	7 - 10	8 - 0	8 - 3	8 - 5	8 - 8	8 - 10	9 - 0	9 - 3	9 - 5	9 - 7	9 - 9	9 - 11	10 - 1
2x 6	12.0	5 - 10	7 - 1	8 - 2	9 - 2	10 - 0	10 - 10	11 - 7	12 - 4	13 - 0	13 - 7	14 - 2	14 - 9	15 - 4	15 - 11	16 - 5	16 - 11	17 - 5	17 - 10	18 - 4	18 - 9	19 - 3	19 - 8	-	-	-	-	-	-	-
	16.0	5 - 0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 5	10 - 0	10 - 8	11 - 3	11 - 9	12 - 4	12 - 10	13 - 3	13 - 9	14 - 2	14 - 8	15 - 1	15 - 6	15 - 11	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	-	-	-	-
	19.2	4 - 7	5 - 7	6 - 6	7 - 3	7 - 11	8 - 7	9 - 2	9 - 9	10 - 3	10 - 9	11 - 3	11 - 8	12 - 2	12 - 7	13 - 0	13 - 4	13 - 9	14 - 2	14 - 6	14 - 10	15 - 2	15 - 7	15 - 11	16 - 2	16 - 6	16 - 10	-	-	-
	24.0	4 - 1	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	13 - 7	13 - 11	14 - 2	14 - 6	14 - 9	15 - 1	15 - 4	15 - 7	15 - 11
2x 8	12.0	7 - 8	9 - 4	10 - 10	12 - 1	13 - 3	14 - 4	15 - 3	16 - 3	17 - 1	17 - 11	18 - 9	19 - 6	20 - 3	20 - 11	21 - 7	22 - 3	22 - 11	23 - 7	24 - 2	24 - 9	25 - 4	25 - 11	-	-	-	-	-	-	-
	16.0	6 - 7	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 0	14 - 10	15 - 6	16 - 3	16 - 10	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	21 - 5	21 - 11	22 - 5	22 - 11	23 - 5	23 - 10	-	-	-	-
	19.2	6 - 1	7 - 5	8 - 7	9 - 7	10 - 6	11 - 4	12 - 1	12 - 10	13 - 6	14 - 2	14 - 10	15 - 5	16 - 0	16 - 7	17 - 1	17 - 7	18 - 2	18 - 7	19 - 1	19 - 7	20 - 0	20 - 6	20 - 11	21 - 4	21 - 9	22 - 2	-	-	-
	24.0	5 - 5	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	17 - 11	18 - 4	18 - 9	19 - 1	19 - 6	19 - 10	20 - 3	20 - 7	20 - 11
2x10	12.0	9 - 9	11 - 11	13 - 9	15 - 5	16 - 11	18 - 3	19 - 6	20 - 8	21 - 10	22 - 10	23 - 11	24 - 10	25 - 10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0	8 - 5	10 - 4	11 - 11	13 - 4	14 - 8	15 - 10	16 - 11	17 - 11	18 - 11	19 - 10	20 - 8	21 - 6	22 - 4	23 - 2	23 - 11	24 - 7	25 - 4	26 - 0	-	-	-	-	-	-	-	-	-	-	-
	19.2	7 - 9	9 - 5	10 - 11	12 - 2	13 - 4	14 - 5	15 - 5	16 - 4	17 - 3	18 - 1	18 - 11	19 - 8	20 - 5	21 - 1	21 - 10	22 - 6	23 - 2	23 - 9	24 - 5	25 - 0	25 - 7	-	-	-	-	-	-	-	-
	24.0	6 - 11	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	22 - 10	23 - 5	23 - 11	24 - 5	24 - 10	25 - 4	25 - 10	-	-
E	12.0	0.06	0.12	0.18	0.25	0.33	0.41	0.51	0.60	0.71	0.82	0.93	1.05	1.17	1.30	1.43	1.57	1.71	1.85	2.00	2.15	2.31	2.47	-	-	-	-	-	-	-
	16.0	0.05	0.10	0.15	0.22	0.28	0.36	0.44	0.52	0.61	0.71	0.80	0.91	1.01	1.13	1.24	1.36	1.48	1.60	1.73	1.86	2.00	2.14	2.28	2.42	2.57	-	-	-	-
	19.2	0.05	0.09	0.14	0.20	0.26	0.33	0.40	0.48	0.56	0.64	0.73	0.83	0.93	1.03	1.13	1.24	1.35	1.46	1.58	1.70	1.82	1.95	2.08	2.21	2.34	2.48	-	-	-
	24.0	0.04	0.08	0.13	0.18	0.23	0.29	0.36	0.43	0.50	0.58	0.66	0.74	0.83	0.92	1.01	1.11	1.21	1.31	1.41	1.52	1.63	1.74	1.86	1.98	2.10	2.22	2.34	2.47	2.60

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-14
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 30 psf plus
Dead Load of 10 psf determines the required bending design value
Deflection - For 30 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	3 - 2	3 - 11	4 - 6	5 - 1	5 - 6	6 - 0	6 - 5	6 - 9	7 - 2	7 - 6	7 - 10	8 - 2	8 - 5	8 - 9	9 - 0	9 - 4	9 - 7	9 - 10	10 - 1	10 - 4	10 - 7	10 - 10	11 - 1	-	-	-	-	-	-
	16 0	2 - 9	3 - 5	3 - 11	4 - 5	4 - 10	5 - 2	5 - 6	5 - 10	6 - 2	6 - 6	6 - 9	7 - 1	7 - 4	7 - 7	7 - 10	8 - 1	8 - 4	8 - 6	8 - 9	9 - 0	9 - 2	9 - 5	9 - 7	9 - 9	10 - 0	-	-	-	-
	19 2	2 - 6	3 - 1	3 - 7	4 - 0	4 - 5	4 - 9	5 - 1	5 - 4	5 - 8	5 - 11	6 - 2	6 - 5	6 - 8	6 - 11	7 - 2	7 - 4	7 - 7	7 - 9	8 - 0	8 - 2	8 - 5	8 - 7	8 - 9	8 - 11	9 - 1	9 - 3	9 - 5	-	-
	24 0	2 - 3	2 - 9	3 - 2	3 - 7	3 - 11	4 - 3	4 - 6	4 - 10	5 - 1	5 - 4	5 - 6	5 - 9	6 - 0	6 - 2	6 - 5	6 - 7	6 - 9	7 - 0	7 - 2	7 - 4	7 - 6	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 5	8 - 7	8 - 9
2x 6	12 0	5 - 0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 5	10 - 0	10 - 8	11 - 3	11 - 9	12 - 4	12 - 10	13 - 3	13 - 9	14 - 2	14 - 8	15 - 1	15 - 6	15 - 11	16 - 3	16 - 8	17 - 0	17 - 5	-	-	-	-	-	-
	16 0	4 - 4	5 - 4	6 - 2	6 - 11	7 - 6	8 - 2	8 - 8	9 - 3	9 - 9	10 - 2	10 - 8	11 - 1	11 - 6	11 - 11	12 - 4	12 - 8	13 - 1	13 - 5	13 - 9	14 - 1	14 - 5	14 - 9	15 - 1	15 - 4	15 - 8	-	-	-	-
	19 2	4 - 0	4 - 10	5 - 7	6 - 3	6 - 11	7 - 5	7 - 11	8 - 5	8 - 11	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 3	11 - 7	11 - 11	12 - 3	12 - 7	12 - 10	13 - 2	13 - 6	13 - 9	14 - 0	14 - 4	14 - 7	14 - 10	-	-
	24 0	3 - 7	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1	13 - 3	13 - 6	13 - 9
2x 8	12 0	6 - 7	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 0	14 - 10	15 - 6	16 - 3	16 - 10	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	21 - 5	21 - 11	22 - 5	22 - 11	-	-	-	-	-	-
	16 0	5 - 9	7 - 0	8 - 1	9 - 1	9 - 11	10 - 9	11 - 6	12 - 2	12 - 10	13 - 5	14 - 0	14 - 7	15 - 2	15 - 8	16 - 3	16 - 9	17 - 2	17 - 8	18 - 2	18 - 7	19 - 0	19 - 5	19 - 10	20 - 3	20 - 8	-	-	-	-
	19 2	5 - 3	6 - 5	7 - 5	8 - 3	9 - 1	9 - 9	10 - 6	11 - 1	11 - 8	12 - 3	12 - 10	13 - 4	13 - 10	14 - 4	14 - 10	15 - 3	15 - 8	16 - 2	16 - 7	16 - 11	17 - 4	17 - 9	18 - 2	18 - 6	18 - 10	19 - 3	19 - 7	-	-
	24 0	4 - 8	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3	16 - 7	16 - 10	17 - 2	17 - 6	17 - 10	18 - 2
2x10	12 0	8 - 5	10 - 4	11 - 11	13 - 4	14 - 8	15 - 10	16 - 11	17 - 11	18 - 11	19 - 10	20 - 8	21 - 6	22 - 4	23 - 2	23 - 11	24 - 7	25 - 4	26 - 0	-	-	-	-	-	-	-	-	-	-	-
	16 0	7 - 4	8 - 11	10 - 4	11 - 7	12 - 8	13 - 8	14 - 8	15 - 6	16 - 4	17 - 2	17 - 11	18 - 8	19 - 4	20 - 0	20 - 8	21 - 4	21 - 11	22 - 6	23 - 2	23 - 8	24 - 3	24 - 10	25 - 4	25 - 10	-	-	-	-	-
	19 2	6 - 8	8 - 2	9 - 5	10 - 7	11 - 7	12 - 6	13 - 4	14 - 2	14 - 11	15 - 8	16 - 4	17 - 0	17 - 8	18 - 3	18 - 11	19 - 6	20 - 0	20 - 7	21 - 1	21 - 8	22 - 2	22 - 8	23 - 2	23 - 7	24 - 1	24 - 6	25 - 0	-	-
	24 0	6 - 0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 11	22 - 4	22 - 9	23 - 2
E	12 0	0 06	0 11	0 17	0 24	0 32	0 40	0 49	0 59	0 69	0 79	0 91	1 02	1 14	1 27	1 39	1 53	1 66	1 80	1 95	2 10	2 25	2 40	2 56	-	-	-	-	-	-
	16 0	0 05	0 10	0 15	0 21	0 28	0 35	0 43	0 51	0 60	0 69	0 78	0 88	0 99	1 10	1 21	1 32	1 44	1 56	1 69	1 82	1 95	2 08	2 22	2 36	2 50	-	-	-	-
	19 2	0 05	0 09	0 14	0 19	0 25	0 32	0 39	0 47	0 54	0 63	0 72	0 81	0 90	1 00	1 10	1 21	1 32	1 43	1 54	1 66	1 78	1 90	2 03	2 15	2 28	2 42	2 55	-	-
	24 0	0 04	0 08	0 12	0 17	0 23	0 29	0 35	0 42	0 49	0 56	0 64	0 72	0 81	0 89	0 99	1 08	1 18	1 28	1 38	1 48	1 59	1 70	1 81	1 93	2 04	2 16	2 28	2 41	2 53

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less Check sources of supply for availability of lumber in lengths greater than 20'

TABLE R-15
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 40 psf plus
Dead Load of 10 psf determines the required bending design value
Deflection - For 40 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12.0	2-10	3-6	4-0	4-6	4-11	5-4	5-9	6-1	6-5	6-8	7-0	7-3	7-7	7-10	8-1	8-4	8-7	8-10	9-0	9-3	9-6	9-8	9-11	10-1	-	-	-	-	-
	16.0	2-6	3-0	3-6	3-11	4-3	4-8	4-11	5-3	5-6	5-10	6-1	6-4	6-7	6-9	7-0	7-3	7-5	7-8	7-10	8-0	8-2	8-5	8-7	8-9	8-11	9-1	-	-	-
	19.2	2-3	2-9	3-2	3-7	3-11	4-3	4-6	4-10	5-1	5-4	5-6	5-9	6-0	6-2	6-5	6-7	6-9	7-0	7-2	7-4	7-6	7-8	7-10	8-0	8-2	8-4	8-5	8-7	-
	24.0	2-0	2-6	2-10	3-2	3-6	3-9	4-0	4-3	4-6	4-9	4-11	5-2	5-4	5-6	5-9	5-11	6-1	6-3	6-5	6-7	6-8	6-10	7-0	7-2	7-3	7-5	7-7	7-8	7-10
2x 6	12.0	4-6	5-6	6-4	7-1	7-9	8-5	9-0	9-6	10-0	10-6	11-0	11-5	11-11	12-4	12-8	13-1	13-6	13-10	14-2	14-7	14-11	15-3	15-7	15-11	-	-	-	-	-
	16.0	3-11	4-9	5-6	6-2	6-9	7-3	7-9	8-3	8-8	9-1	9-6	9-11	10-3	10-8	11-0	11-4	11-8	12-0	12-4	12-7	12-11	13-2	13-6	13-9	14-0	14-3	-	-	-
	19.2	3-7	4-4	5-0	5-7	6-2	6-8	7-1	7-6	7-11	8-4	8-8	9-1	9-5	9-9	10-0	10-4	10-8	10-11	11-3	11-6	11-9	12-0	12-4	12-7	12-10	13-1	13-3	13-6	-
	24.0	3-2	3-11	4-6	5-0	5-6	5-11	6-4	6-9	7-1	7-5	7-9	8-1	8-5	8-8	9-0	9-3	9-6	9-9	10-0	10-3	10-6	10-9	11-0	11-3	11-5	11-8	11-11	12-1	12-4
2x 8	12.0	5-11	7-3	8-4	9-4	10-3	11-1	11-10	12-7	13-3	13-11	14-6	15-1	15-8	16-3	16-9	17-3	17-9	18-3	18-9	19-2	19-8	20-1	20-6	20-11	-	-	-	-	-
	16.0	5-2	6-3	7-3	8-1	8-11	9-7	10-3	10-11	11-6	12-0	12-7	13-1	13-7	14-0	14-6	14-11	15-5	15-10	16-3	16-7	17-0	17-5	17-9	18-2	18-6	18-10	-	-	-
	19.2	4-8	5-9	6-7	7-5	8-1	8-9	9-4	9-11	10-6	11-0	11-6	11-11	12-5	12-10	13-3	13-8	14-0	14-5	14-10	15-2	15-6	15-10	16-3	16-7	16-10	17-2	17-6	17-10	-
	24.0	4-2	5-2	5-11	6-7	7-3	7-10	8-4	8-11	9-4	9-10	10-3	10-8	11-1	11-6	11-10	12-2	12-7	12-11	13-3	13-7	13-11	14-2	14-6	14-10	15-1	15-5	15-8	15-11	16-3
2x10	12.0	7-7	9-3	10-8	11-11	13-1	14-2	15-1	16-0	16-11	17-9	18-6	19-3	20-0	20-8	21-4	22-0	22-8	23-3	23-11	24-6	25-1	25-7	-	-	-	-	-	-	-
	16.0	6-6	8-0	9-3	10-4	11-4	12-3	13-1	13-11	14-8	15-4	16-0	16-8	17-4	17-11	18-6	19-1	19-7	20-2	20-8	21-2	21-8	22-2	22-8	23-2	23-7	24-0	-	-	-
	19.2	6-0	7-4	8-5	9-5	10-4	11-2	11-11	12-8	13-4	14-0	14-8	15-3	15-10	16-4	16-11	17-5	17-11	18-5	18-11	19-4	19-10	20-3	20-8	21-1	21-6	21-11	22-4	22-9	-
	24.0	5-4	6-6	7-7	8-5	9-3	10-0	10-8	11-4	11-11	12-6	13-1	13-7	14-2	14-8	15-1	15-7	16-0	16-6	16-11	17-4	17-9	18-1	18-6	18-11	19-3	19-7	20-0	20-4	20-8
E	12.0	0.06	0.11	0.17	0.23	0.31	0.38	0.47	0.56	0.66	0.76	0.86	0.97	1.09	1.21	1.33	1.46	1.59	1.72	1.86	2.00	2.14	2.29	2.44	2.60	-	-	-	-	-
	16.0	0.05	0.09	0.14	0.20	0.26	0.33	0.41	0.49	0.57	0.66	0.75	0.84	0.94	1.05	1.15	1.26	1.37	1.49	1.61	1.73	1.86	1.99	2.12	2.25	2.39	2.53	-	-	-
	19.2	0.05	0.09	0.13	0.18	0.24	0.30	0.37	0.44	0.52	0.60	0.68	0.77	0.86	0.95	1.05	1.15	1.25	1.36	1.47	1.58	1.70	1.81	1.93	2.05	2.18	2.31	2.43	2.57	-
	24.0	0.04	0.08	0.12	0.16	0.22	0.27	0.33	0.40	0.46	0.54	0.61	0.69	0.77	0.85	0.94	1.03	1.12	1.22	1.31	1.41	1.52	1.62	1.73	1.84	1.95	2.06	2.18	2.30	2.41

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

American Wood Council

TABLE R-16
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 50 psf plus
Dead Load of 10 psf determines the required bending design value
Deflection - For 50 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	2 - 7	3 - 2	3 - 8	4 - 1	4 - 6	4 - 11	5 - 3	5 - 6	5 - 10	6 - 1	6 - 5	6 - 8	6 - 11	7 - 2	7 - 5	7 - 7	7 - 10	8 - 0	8 - 3	8 - 5	8 - 8	8 - 10	9 - 0	9 - 3	-	-	-	-	-
	16 0	2 - 3	2 - 9	3 - 2	3 - 7	3 - 11	4 - 3	4 - 6	4 - 10	5 - 1	5 - 4	5 - 6	5 - 9	6 - 0	6 - 2	6 - 5	6 - 7	6 - 9	7 - 0	7 - 2	7 - 4	7 - 6	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 5	-	-
	19 2	2 - 1	2 - 6	2 - 11	3 - 3	3 - 7	3 - 10	4 - 1	4 - 5	4 - 7	4 - 10	5 - 1	5 - 3	5 - 5	5 - 8	5 - 10	6 - 0	6 - 2	6 - 4	6 - 6	6 - 8	6 - 10	7 - 0	7 - 2	7 - 4	7 - 5	7 - 7	7 - 9	7 - 10	8 - 0
	24 0	1 - 10	2 - 3	2 - 7	2 - 11	3 - 2	3 - 5	3 - 8	3 - 11	4 - 1	4 - 4	4 - 6	4 - 8	4 - 11	5 - 1	5 - 3	5 - 5	5 - 6	5 - 8	5 - 10	6 - 0	6 - 1	6 - 3	6 - 5	6 - 6	6 - 8	6 - 9	6 - 11	7 - 0	7 - 2
2x 6	12 0	4 - 1	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	13 - 7	13 - 11	14 - 2	14 - 6	-	-	-	-	-
	16 0	3 - 7	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1	13 - 3	-	-
	19 2	3 - 3	4 - 0	4 - 7	5 - 1	5 - 7	6 - 1	6 - 6	6 - 11	7 - 3	7 - 7	7 - 11	8 - 3	8 - 7	8 - 11	9 - 2	9 - 5	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	11 - 0	11 - 3	11 - 6	11 - 8	11 - 11	12 - 2	12 - 4	12 - 7
	24 0	2 - 11	3 - 7	4 - 1	4 - 7	5 - 0	5 - 5	5 - 10	6 - 2	6 - 6	6 - 10	7 - 1	7 - 5	7 - 8	7 - 11	8 - 2	8 - 5	8 - 8	8 - 11	9 - 2	9 - 5	9 - 7	9 - 10	10 - 0	10 - 3	10 - 5	10 - 8	10 - 10	11 - 0	11 - 3
2x 8	12 0	5 - 5	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	17 - 11	18 - 4	18 - 9	19 - 1	-	-	-	-	-
	16 0	4 - 8	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3	16 - 7	16 - 10	17 - 2	17 - 6	-	-
	19 2	4 - 3	5 - 3	6 - 1	6 - 9	7 - 5	8 - 0	8 - 7	9 - 1	9 - 7	10 - 0	10 - 6	10 - 11	11 - 4	11 - 8	12 - 1	12 - 5	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 6	14 - 10	15 - 1	15 - 5	15 - 8	16 - 0	16 - 3	16 - 7
	24 0	3 - 10	4 - 8	5 - 5	6 - 1	6 - 7	7 - 2	7 - 8	8 - 1	8 - 7	9 - 0	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 2	11 - 6	11 - 9	12 - 1	12 - 5	12 - 8	12 - 11	13 - 3	13 - 6	13 - 9	14 - 0	14 - 4	14 - 7	14 - 10
2x10	12 0	6 - 11	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	22 - 10	23 - 5	23 - 11	24 - 5	-	-	-	-	-
	16 0	6 - 0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 11	22 - 4	-	-
	19 2	5 - 5	6 - 8	7 - 9	8 - 7	9 - 5	10 - 2	10 - 11	11 - 7	12 - 2	12 - 9	13 - 4	13 - 11	14 - 5	14 - 11	15 - 5	15 - 11	16 - 4	16 - 10	17 - 3	17 - 8	18 - 1	18 - 6	18 - 11	19 - 3	19 - 8	20 - 0	20 - 5	20 - 9	21 - 1
	24 0	4 - 11	6 - 0	6 - 11	7 - 9	8 - 5	9 - 1	9 - 9	10 - 4	10 - 11	11 - 5	11 - 11	12 - 5	12 - 11	13 - 4	13 - 9	14 - 3	14 - 8	15 - 0	15 - 5	15 - 10	16 - 2	16 - 6	16 - 11	17 - 3	17 - 7	17 - 11	18 - 3	18 - 7	18 - 11
E	12 0	0 06	0 10	0 16	0 22	0 29	0 37	0 45	0 53	0 63	0 72	0 82	0 93	1 04	1 15	1 26	1 39	1 51	1 64	1 77	1 90	2 04	2 18	2 32	2 47	-	-	-	-	-
	16 0	0 05	0 09	0 14	0 19	0 25	0 32	0 39	0 46	0 54	0 62	0 71	0 80	0 90	0 99	1 10	1 20	1 31	1 42	1 53	1 65	1 77	1 89	2 01	2 14	2 27	2 40	2 54	-	-
	19 2	0 04	0 08	0 13	0 17	0 23	0 29	0 35	0 42	0 49	0 57	0 65	0 73	0 82	0 91	1 00	1 10	1 19	1 29	1 40	1 50	1 61	1 72	1 84	1 95	2 07	2 19	2 32	2 44	2 57
	24 0	0 04	0 07	0 11	0 16	0 21	0 26	0 32	0 38	0 44	0 51	0 58	0 66	0 73	0 81	0 89	0 98	1 07	1 16	1 25	1 34	1 44	1 54	1 64	1 75	1 85	1 96	2 07	2 18	2 30

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'

TABLE R-17
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 20 psf plus
Dead Load of 15 psf determines the required bending design value
Deflection - For 20 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																											
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	3 - 5	4 - 2	4 - 10	5 - 5	5 - 11	6 - 5	6 - 10	7 - 3	7 - 8	8 - 0	8 - 4	8 - 8	9 - 0	9 - 4	9 - 8	9 - 11	10 - 3	10 - 6	10 - 10	11 - 1	11 - 4	11 - 7	11 - 10	12 - 1	12 - 4	12 - 7	-	-	-
	16 0	2 - 11	3 - 7	4 - 2	4 - 8	5 - 1	5 - 6	5 - 11	6 - 3	6 - 7	6 - 11	7 - 3	7 - 6	7 - 10	8 - 1	8 - 4	8 - 7	8 - 10	9 - 1	9 - 4	9 - 7	9 - 10	10 - 0	10 - 3	10 - 5	10 - 8	10 - 10	11 - 1	11 - 3	11 - 5
	19 2	2 - 8	3 - 4	3 - 10	4 - 3	4 - 8	5 - 1	5 - 5	5 - 9	6 - 0	6 - 4	6 - 7	6 - 11	7 - 2	7 - 5	7 - 8	7 - 10	8 - 1	8 - 4	8 - 6	8 - 9	8 - 11	9 - 2	9 - 4	9 - 7	9 - 9	9 - 11	10 - 1	10 - 3	10 - 5
	24 0	2 - 5	2 - 11	3 - 5	3 - 10	4 - 2	4 - 6	4 - 10	5 - 1	5 - 5	5 - 8	5 - 11	6 - 2	6 - 5	6 - 7	6 - 10	7 - 0	7 - 3	7 - 5	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4
2x 6	12 0	5 - 4	6 - 7	7 - 7	8 - 6	9 - 4	10 - 0	10 - 9	11 - 5	12 - 0	12 - 7	13 - 2	13 - 8	14 - 2	14 - 8	15 - 2	15 - 8	16 - 1	16 - 7	17 - 0	17 - 5	17 - 10	18 - 2	18 - 7	19 - 0	19 - 4	19 - 9	-	-	-
	16 0	4 - 8	5 - 8	6 - 7	7 - 4	8 - 1	8 - 8	9 - 4	9 - 10	10 - 5	10 - 11	11 - 5	11 - 10	12 - 4	12 - 9	13 - 2	13 - 7	13 - 11	14 - 4	14 - 8	15 - 1	15 - 5	15 - 9	16 - 1	16 - 5	16 - 9	17 - 1	17 - 5	17 - 8	18 - 0
	19 2	4 - 3	5 - 2	6 - 0	6 - 9	7 - 4	7 - 11	8 - 6	9 - 0	9 - 6	9 - 11	10 - 5	10 - 10	11 - 3	11 - 7	12 - 0	12 - 4	12 - 9	13 - 1	13 - 5	13 - 9	14 - 1	14 - 5	14 - 8	15 - 0	15 - 4	15 - 7	15 - 11	16 - 2	16 - 5
	24 0	3 - 10	4 - 8	5 - 4	6 - 0	6 - 7	7 - 1	7 - 7	8 - 1	8 - 6	8 - 11	9 - 4	9 - 8	10 - 0	10 - 5	10 - 9	11 - 1	11 - 5	11 - 8	12 - 0	12 - 4	12 - 7	12 - 10	13 - 2	13 - 5	13 - 8	13 - 11	14 - 2	14 - 5	14 - 8
2x 8	12 0	7 - 1	8 - 8	10 - 0	11 - 2	12 - 3	13 - 3	14 - 2	15 - 0	15 - 10	16 - 7	17 - 4	18 - 0	18 - 9	19 - 5	20 - 0	20 - 8	21 - 3	21 - 10	22 - 4	22 - 11	23 - 6	24 - 0	24 - 6	25 - 0	25 - 6	26 - 0	-	-	-
	16 0	6 - 2	7 - 6	8 - 8	9 - 8	10 - 7	11 - 6	12 - 3	13 - 0	13 - 8	14 - 4	15 - 0	15 - 7	16 - 3	16 - 9	17 - 4	17 - 10	18 - 5	18 - 11	19 - 5	19 - 10	20 - 4	20 - 9	21 - 3	21 - 8	22 - 1	22 - 6	22 - 11	23 - 4	23 - 9
	19 2	5 - 7	6 - 10	7 - 11	8 - 10	9 - 8	10 - 6	11 - 2	11 - 10	12 - 6	13 - 1	13 - 8	14 - 3	14 - 10	15 - 4	15 - 10	16 - 4	16 - 9	17 - 3	17 - 8	18 - 2	18 - 7	19 - 0	19 - 5	19 - 9	20 - 2	20 - 7	20 - 11	21 - 4	21 - 8
	24 0	5 - 0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 4	10 - 0	10 - 7	11 - 2	11 - 9	12 - 3	12 - 9	13 - 3	13 - 8	14 - 2	14 - 7	15 - 0	15 - 5	15 - 10	16 - 3	16 - 7	17 - 0	17 - 4	17 - 8	18 - 0	18 - 5	18 - 9	19 - 1	19 - 5
2x10	12 0	9 - 0	11 - 1	12 - 9	14 - 3	15 - 8	16 - 11	18 - 1	19 - 2	20 - 2	21 - 2	22 - 1	23 - 0	23 - 11	24 - 9	25 - 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16 0	7 - 10	9 - 7	11 - 1	12 - 4	13 - 6	14 - 8	15 - 8	16 - 7	17 - 6	18 - 4	19 - 2	19 - 11	20 - 8	21 - 5	22 - 1	22 - 10	23 - 5	24 - 1	24 - 9	25 - 4	25 - 11	-	-	-	-	-	-	-	-	-
	19 2	7 - 2	8 - 9	10 - 1	11 - 3	12 - 4	13 - 4	14 - 3	15 - 2	15 - 11	16 - 9	17 - 6	18 - 2	18 - 11	19 - 7	20 - 2	20 - 10	21 - 5	22 - 0	22 - 7	23 - 2	23 - 8	24 - 2	24 - 9	25 - 3	25 - 9	-	-	-	-
	24 0	6 - 5	7 - 10	9 - 0	10 - 1	11 - 1	11 - 11	12 - 9	13 - 6	14 - 3	15 - 0	15 - 8	16 - 3	16 - 11	17 - 6	18 - 1	18 - 7	19 - 2	19 - 8	20 - 2	20 - 8	21 - 2	21 - 8	22 - 1	22 - 7	23 - 0	23 - 5	23 - 11	24 - 4	24 - 9
E	12 0	0 05	0 09	0 14	0 20	0 26	0 33	0 40	0 48	0 56	0 65	0 74	0 83	0 93	1 03	1 14	1 24	1 36	1 47	1 59	1 71	1 83	1 96	2 09	2 22	2 35	2 49	-	-	-
	16 0	0 04	0 08	0 12	0 17	0 23	0 28	0 35	0 41	0 49	0 56	0 64	0 72	0 80	0 89	0 98	1 08	1 17	1 27	1 37	1 48	1 59	1 70	1 81	1 92	2 04	2 16	2 28	2 40	2 53
	19 2	0 04	0 07	0 11	0 16	0 21	0 26	0 32	0 38	0 44	0 51	0 58	0 66	0 73	0 81	0 90	0 98	1 07	1 16	1 25	1 35	1 45	1 55	1 65	1 75	1 86	1 97	2 08	2 19	2 31
	24 0	0 04	0 07	0 10	0 14	0 18	0 23	0 28	0 34	0 40	0 46	0 52	0 59	0 66	0 73	0 80	0 88	0 96	1 04	1 12	1 21	1 29	1 38	1 48	1 57	1 66	1 76	1 86	1 96	2 06

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'

TABLE R-18
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 30 psf plus
Dead Load of 15 psf determines the required bending design value
Deflection - For 30 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	3 - 0	3 - 8	4 - 3	4 - 9	5 - 3	5 - 8	6 - 0	6 - 5	6 - 9	7 - 1	7 - 5	7 - 8	8 - 0	8 - 3	8 - 6	8 - 9	9 - 0	9 - 3	9 - 6	9 - 9	10 - 0	10 - 3	10 - 5	10 - 8	10 - 10	11 - 1	-	-	-
	16 0	2 - 7	3 - 2	3 - 8	4 - 1	4 - 6	4 - 11	5 - 3	5 - 6	5 - 10	6 - 1	6 - 5	6 - 8	6 - 11	7 - 2	7 - 5	7 - 7	7 - 10	8 - 0	8 - 3	8 - 5	8 - 8	8 - 10	9 - 0	9 - 3	9 - 5	9 - 7	9 - 9	9 - 11	10 - 1
	19 2	2 - 5	2 - 11	3 - 4	3 - 9	4 - 1	4 - 5	4 - 9	5 - 1	5 - 4	5 - 7	5 - 10	6 - 1	6 - 4	6 - 6	6 - 9	6 - 11	7 - 2	7 - 4	7 - 6	7 - 9	7 - 11	8 - 1	8 - 3	8 - 5	8 - 7	8 - 9	8 - 11	9 - 1	9 - 3
	24 0	2 - 2	2 - 7	3 - 0	3 - 4	3 - 8	4 - 0	4 - 3	4 - 6	4 - 9	5 - 0	5 - 3	5 - 5	5 - 8	5 - 10	6 - 0	6 - 3	6 - 5	6 - 7	6 - 9	6 - 11	7 - 1	7 - 3	7 - 5	7 - 6	7 - 8	7 - 10	8 - 0	8 - 1	8 - 3
2x 6	12 0	4 - 9	5 - 10	6 - 8	7 - 6	8 - 2	8 - 10	9 - 6	10 - 0	10 - 7	11 - 1	11 - 7	12 - 1	12 - 6	13 - 0	13 - 5	13 - 10	14 - 2	14 - 7	15 - 0	15 - 4	15 - 8	16 - 1	16 - 5	16 - 9	17 - 1	17 - 5	-	-	-
	16 0	4 - 1	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	13 - 7	13 - 11	14 - 2	14 - 6	14 - 9	15 - 1	15 - 4	15 - 7	15 - 11
	19 2	3 - 9	4 - 7	5 - 4	5 - 11	6 - 6	7 - 0	7 - 6	7 - 11	8 - 4	8 - 9	9 - 2	9 - 6	9 - 11	10 - 3	10 - 7	10 - 11	11 - 3	11 - 6	11 - 10	12 - 2	12 - 5	12 - 8	13 - 0	13 - 3	13 - 6	13 - 9	14 - 0	14 - 3	14 - 6
	24 0	3 - 4	4 - 1	4 - 9	5 - 4	5 - 10	6 - 3	6 - 8	7 - 1	7 - 6	7 - 10	8 - 2	8 - 6	8 - 10	9 - 2	9 - 6	9 - 9	10 - 0	10 - 4	10 - 7	10 - 10	11 - 1	11 - 4	11 - 7	11 - 10	12 - 1	12 - 4	12 - 6	12 - 9	13 - 0
2x 8	12 0	6 - 3	7 - 8	8 - 10	9 - 10	10 - 10	11 - 8	12 - 6	13 - 3	13 - 11	14 - 8	15 - 3	15 - 11	16 - 6	17 - 1	17 - 8	18 - 2	18 - 9	19 - 3	19 - 9	20 - 3	20 - 8	21 - 2	21 - 7	22 - 1	22 - 6	22 - 11	-	-	-
	16 0	5 - 5	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	17 - 11	18 - 4	18 - 9	19 - 1	19 - 6	19 - 10	20 - 3	20 - 7	20 - 11
	19 2	4 - 11	6 - 1	7 - 0	7 - 10	8 - 7	9 - 3	9 - 10	10 - 6	11 - 0	11 - 7	12 - 1	12 - 7	13 - 1	13 - 6	13 - 11	14 - 5	14 - 10	15 - 2	15 - 7	16 - 0	16 - 4	16 - 9	17 - 1	17 - 5	17 - 9	18 - 2	18 - 5	18 - 9	19 - 1
	24 0	4 - 5	5 - 5	6 - 3	7 - 0	7 - 8	8 - 3	8 - 10	9 - 4	9 - 10	10 - 4	10 - 10	11 - 3	11 - 8	12 - 1	12 - 6	12 - 10	13 - 3	13 - 7	13 - 11	14 - 4	14 - 8	15 - 0	15 - 3	15 - 7	15 - 11	16 - 3	16 - 6	16 - 10	17 - 1
2x10	12 0	8 - 0	9 - 9	11 - 3	12 - 7	13 - 9	14 - 11	15 - 11	16 - 11	17 - 10	18 - 8	19 - 6	20 - 4	21 - 1	21 - 10	22 - 6	23 - 3	23 - 11	24 - 6	25 - 2	25 - 10	-	-	-	-	-	-	-	-	-
	16 0	6 - 11	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	22 - 10	23 - 5	23 - 11	24 - 5	24 - 10	25 - 4	25 - 10	-	-
	19 2	6 - 4	7 - 9	8 - 11	9 - 11	10 - 11	11 - 9	12 - 7	13 - 4	14 - 1	14 - 9	15 - 5	16 - 1	16 - 8	17 - 3	17 - 10	18 - 4	18 - 11	19 - 5	19 - 11	20 - 5	20 - 10	21 - 4	21 - 10	22 - 3	22 - 8	23 - 2	23 - 7	24 - 0	24 - 5
	24 0	5 - 8	6 - 11	8 - 0	8 - 11	9 - 9	10 - 6	11 - 3	11 - 11	12 - 7	13 - 2	13 - 9	14 - 4	14 - 11	15 - 5	15 - 11	16 - 5	16 - 11	17 - 4	17 - 10	18 - 3	18 - 8	19 - 1	19 - 6	19 - 11	20 - 4	20 - 8	21 - 1	21 - 5	21 - 10
E	12 0	0 05	0 09	0 15	0 20	0 27	0 34	0 41	0 49	0 58	0 67	0 76	0 86	0 96	1 06	1 17	1 28	1 39	1 51	1 63	1 76	1 88	2 01	2 15	2 28	2 42	2 56	-	-	-
	16 0	0 04	0 08	0 13	0 18	0 23	0 29	0 36	0 43	0 50	0 58	0 66	0 74	0 83	0 92	1 01	1 11	1 21	1 31	1 41	1 52	1 63	1 74	1 86	1 98	2 10	2 22	2 34	2 47	2 60
	19 2	0 04	0 08	0 12	0 16	0 21	0 27	0 33	0 39	0 46	0 53	0 60	0 68	0 76	0 84	0 92	1 01	1 10	1 20	1 29	1 39	1 49	1 59	1 70	1 80	1 91	2 03	2 14	2 25	2 37
	24 0	0 04	0 07	0 10	0 14	0 19	0 24	0 29	0 35	0 41	0 47	0 54	0 61	0 68	0 75	0 83	0 90	0 99	1 07	1 15	1 24	1 33	1 42	1 52	1 61	1 71	1 81	1 91	2 02	2 12

Note The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown Spans are shown in feet-inches and are limited to 26' and less Check sources of supply for availability of lumber in lengths greater than 20'

TABLE R-19
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 40 psf plus
Dead Load of 15 psf determines the required bending design value
Deflection - For 40 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	2 - 9	3 - 4	3 - 10	4 - 4	4 - 9	5 - 1	5 - 5	5 - 9	6 - 1	6 - 5	6 - 8	6 - 11	7 - 3	7 - 6	7 - 8	7 - 11	8 - 2	8 - 5	8 - 7	8 - 10	9 - 0	9 - 3	9 - 5	9 - 8	9 - 10	10 - 0	-	-	-
	16 0	2 - 4	2 - 11	3 - 4	3 - 9	4 - 1	4 - 5	4 - 9	5 - 0	5 - 3	5 - 6	5 - 9	6 - 0	6 - 3	6 - 6	6 - 8	6 - 11	7 - 1	7 - 3	7 - 6	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2
	19 2	2 - 2	2 - 8	3 - 1	3 - 5	3 - 9	4 - 0	4 - 4	4 - 7	4 - 10	5 - 1	5 - 3	5 - 6	5 - 8	5 - 11	6 - 1	6 - 3	6 - 6	6 - 8	6 - 10	7 - 0	7 - 2	7 - 4	7 - 6	7 - 7	7 - 9	7 - 11	8 - 1	8 - 2	8 - 4
	24 0	1 - 11	2 - 4	2 - 9	3 - 1	3 - 4	3 - 7	3 - 10	4 - 1	4 - 4	4 - 6	4 - 9	4 - 11	5 - 1	5 - 3	5 - 5	5 - 7	5 - 9	5 - 11	6 - 1	6 - 3	6 - 5	6 - 6	6 - 8	6 - 10	6 - 11	7 - 1	7 - 3	7 - 4	7 - 6
2x 6	12 0	4 - 3	5 - 3	6 - 1	6 - 9	7 - 5	8 - 0	8 - 7	9 - 1	9 - 7	10 - 0	10 - 6	10 - 11	11 - 4	11 - 9	12 - 1	12 - 6	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 6	14 - 10	15 - 2	15 - 5	15 - 9	-	-	-
	16 0	3 - 8	4 - 6	5 - 3	5 - 10	6 - 5	6 - 11	7 - 5	7 - 10	8 - 3	8 - 8	9 - 1	9 - 5	9 - 10	10 - 2	10 - 6	10 - 10	11 - 1	11 - 5	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1	13 - 4	13 - 7	13 - 10	14 - 1	14 - 4
	19 2	3 - 5	4 - 2	4 - 9	5 - 4	5 - 10	6 - 4	6 - 9	7 - 2	7 - 7	7 - 11	8 - 3	8 - 8	8 - 11	9 - 3	9 - 7	9 - 10	10 - 2	10 - 5	10 - 8	11 - 0	11 - 3	11 - 6	11 - 9	12 - 0	12 - 2	12 - 5	12 - 8	12 - 11	13 - 1
	24 0	3 - 0	3 - 8	4 - 3	4 - 9	5 - 3	5 - 8	6 - 1	6 - 5	6 - 9	7 - 1	7 - 5	7 - 9	8 - 0	8 - 3	8 - 7	8 - 10	9 - 1	9 - 4	9 - 7	9 - 10	10 - 0	10 - 3	10 - 6	10 - 8	10 - 11	11 - 1	11 - 4	11 - 6	11 - 9
2x 8	12 0	5 - 8	6 - 11	8 - 0	8 - 11	9 - 9	10 - 7	11 - 3	12 - 0	12 - 7	13 - 3	13 - 10	14 - 5	14 - 11	15 - 5	16 - 0	16 - 5	16 - 11	17 - 5	17 - 10	18 - 3	18 - 9	19 - 2	19 - 7	19 - 11	20 - 4	20 - 9	-	-	-
	16 0	4 - 11	6 - 0	6 - 11	7 - 9	8 - 6	9 - 2	9 - 9	10 - 4	10 - 11	11 - 6	12 - 0	12 - 6	12 - 11	13 - 5	13 - 10	14 - 3	14 - 8	15 - 1	15 - 5	15 - 10	16 - 3	16 - 7	16 - 11	17 - 3	17 - 7	18 - 0	18 - 3	18 - 7	18 - 11
	19 2	4 - 6	5 - 6	6 - 4	7 - 1	7 - 9	8 - 4	8 - 11	9 - 6	10 - 0	10 - 6	10 - 11	11 - 5	11 - 10	12 - 3	12 - 7	13 - 0	13 - 5	13 - 9	14 - 1	14 - 6	14 - 10	15 - 2	15 - 5	15 - 9	16 - 1	16 - 5	16 - 8	17 - 0	17 - 3
	24 0	4 - 0	4 - 11	5 - 8	6 - 4	6 - 11	7 - 6	8 - 0	8 - 6	8 - 11	9 - 4	9 - 9	10 - 2	10 - 7	10 - 11	11 - 3	11 - 8	12 - 0	12 - 4	12 - 7	12 - 11	13 - 3	13 - 6	13 - 10	14 - 1	14 - 5	14 - 8	14 - 11	15 - 2	15 - 5
2x10	12 0	7 - 2	8 - 10	10 - 2	11 - 5	12 - 6	13 - 6	14 - 5	15 - 3	16 - 1	16 - 11	17 - 8	18 - 4	19 - 1	19 - 9	20 - 4	21 - 0	21 - 7	22 - 2	22 - 9	23 - 4	23 - 11	24 - 5	24 - 11	25 - 6	26 - 0	-	-	-	-
	16 0	6 - 3	7 - 8	8 - 10	9 - 10	10 - 10	11 - 8	12 - 6	13 - 3	13 - 11	14 - 8	15 - 3	15 - 11	16 - 6	17 - 1	17 - 8	18 - 2	18 - 9	19 - 3	19 - 9	20 - 2	20 - 8	21 - 2	21 - 7	22 - 1	22 - 6	22 - 11	23 - 4	23 - 9	24 - 2
	19 2	5 - 8	7 - 0	8 - 1	9 - 0	9 - 10	10 - 8	11 - 5	12 - 1	12 - 9	13 - 4	13 - 11	14 - 6	15 - 1	15 - 7	16 - 1	16 - 7	17 - 1	17 - 7	18 - 0	18 - 5	18 - 11	19 - 4	19 - 9	20 - 2	20 - 6	20 - 11	21 - 4	21 - 8	22 - 1
	24 0	5 - 1	6 - 3	7 - 2	8 - 1	8 - 10	9 - 6	10 - 2	10 - 10	11 - 5	11 - 11	12 - 6	13 - 0	13 - 6	13 - 11	14 - 5	14 - 10	15 - 3	15 - 8	16 - 1	16 - 6	16 - 11	17 - 3	17 - 8	18 - 0	18 - 4	18 - 9	19 - 1	19 - 5	19 - 9
E	12 0	0 05	0 09	0 14	0 20	0 26	0 33	0 41	0 49	0 57	0 66	0 75	0 84	0 94	1 05	1 15	1 26	1 38	1 49	1 61	1 73	1 86	1 99	2 12	2 25	2 39	2 53	-	-	-
	16 0	0 04	0 08	0 12	0 17	0 23	0 29	0 35	0 42	0 49	0 57	0 65	0 73	0 82	0 91	1 00	1 09	1 19	1 29	1 40	1 50	1 61	1 72	1 83	1 95	2 07	2 19	2 31	2 44	2 56
	19 2	0 04	0 07	0 11	0 16	0 21	0 26	0 32	0 38	0 45	0 52	0 59	0 67	0 75	0 83	0 91	1 00	1 09	1 18	1 27	1 37	1 47	1 57	1 67	1 78	1 89	2 00	2 11	2 22	2 34
	24 0	0 04	0 07	0 10	0 14	0 19	0 24	0 29	0 34	0 40	0 46	0 53	0 60	0 67	0 74	0 82	0 89	0 97	1 06	1 14	1 23	1 31	1 41	1 50	1 59	1 69	1 79	1 89	1 99	2 09

Note The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table. is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown Spans are shown in feet-inches and are limited to 26' and less Check sources of supply for availability of lumber in lengths greater than 20'

American Wood Council

TABLE R-20
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 50 psf plus
Dead Load of 15 psf determines the required bending design value
Deflection - For 50 psf live load
Limited to span in inches divided by 180

Rafter Size	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	2 - 6	3 - 1	3 - 7	4 - 0	4 - 4	4 - 8	5 - 0	5 - 4	5 - 7	5 - 11	6 - 2	6 - 5	6 - 8	6 - 10	7 - 1	7 - 4	7 - 6	7 - 9	7 - 11	8 - 1	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 3	9 - 5	-	-
	16 0	2 - 2	2 - 8	3 - 1	3 - 5	3 - 9	4 - 1	4 - 4	4 - 7	4 - 10	5 - 1	5 - 4	5 - 6	5 - 9	5 - 11	6 - 2	6 - 4	6 - 6	6 - 8	6 - 10	7 - 0	7 - 2	7 - 4	7 - 6	7 - 8	7 - 10	8 - 0	8 - 1	8 - 3	8 - 5
	19 2	2 - 0	2 - 5	2 - 10	3 - 2	3 - 5	3 - 8	4 - 0	4 - 2	4 - 5	4 - 8	4 - 10	5 - 1	5 - 3	5 - 5	5 - 7	5 - 9	5 - 11	6 - 1	6 - 3	6 - 5	6 - 7	6 - 9	6 - 10	7 - 0	7 - 2	7 - 3	7 - 5	7 - 7	7 - 8
	24 0	1 - 9	2 - 2	2 - 6	2 - 10	3 - 1	3 - 4	3 - 7	3 - 9	4 - 0	4 - 2	4 - 4	4 - 6	4 - 8	4 - 10	5 - 0	5 - 2	5 - 4	5 - 6	5 - 7	5 - 9	5 - 11	6 - 0	6 - 2	6 - 3	6 - 5	6 - 6	6 - 8	6 - 9	6 - 10
2x 6	12 0	3 - 11	4 - 10	5 - 7	6 - 3	6 - 10	7 - 4	7 - 11	8 - 4	8 - 10	9 - 3	9 - 8	10 - 0	10 - 5	10 - 9	11 - 2	11 - 6	11 - 10	12 - 2	12 - 5	12 - 9	13 - 1	13 - 4	13 - 8	13 - 11	14 - 2	14 - 6	14 - 9	-	-
	16 0	3 - 5	4 - 2	4 - 10	5 - 5	5 - 11	6 - 5	6 - 10	7 - 3	7 - 8	8 - 0	8 - 4	8 - 8	9 - 0	9 - 4	9 - 8	9 - 11	10 - 3	10 - 6	10 - 9	11 - 1	11 - 4	11 - 7	11 - 10	12 - 1	12 - 4	12 - 6	12 - 9	13 - 0	13 - 3
	19 2	3 - 1	3 - 10	4 - 5	4 - 11	5 - 5	5 - 10	6 - 3	6 - 7	7 - 0	7 - 4	7 - 8	7 - 11	8 - 3	8 - 6	8 - 10	9 - 1	9 - 4	9 - 7	9 - 10	10 - 1	10 - 4	10 - 7	10 - 9	11 - 0	11 - 3	11 - 5	11 - 8	11 - 10	12 - 1
	24 0	2 - 9	3 - 5	3 - 11	4 - 5	4 - 10	5 - 3	5 - 7	5 - 11	6 - 3	6 - 6	6 - 10	7 - 1	7 - 4	7 - 8	7 - 11	8 - 1	8 - 4	8 - 7	8 - 10	9 - 0	9 - 3	9 - 5	9 - 8	9 - 10	10 - 0	10 - 3	10 - 5	10 - 7	10 - 9
2x 8	12 0	5 - 2	6 - 4	7 - 4	8 - 3	9 - 0	9 - 9	10 - 5	11 - 0	11 - 7	12 - 2	12 - 9	13 - 3	13 - 9	14 - 3	14 - 8	15 - 2	15 - 7	16 - 0	16 - 5	16 - 10	17 - 3	17 - 7	18 - 0	18 - 4	18 - 9	19 - 1	19 - 5	-	-
	16 0	4 - 6	5 - 6	6 - 4	7 - 1	7 - 9	8 - 5	9 - 0	9 - 6	10 - 1	10 - 7	11 - 0	11 - 6	11 - 11	12 - 4	12 - 9	13 - 1	13 - 6	13 - 10	14 - 3	14 - 7	14 - 11	15 - 3	15 - 7	15 - 11	16 - 3	16 - 6	16 - 10	17 - 1	17 - 5
	19 2	4 - 1	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 3	8 - 8	9 - 2	9 - 8	10 - 1	10 - 6	10 - 10	11 - 3	11 - 7	12 - 0	12 - 4	12 - 8	13 - 0	13 - 4	13 - 7	13 - 11	14 - 3	14 - 6	14 - 10	15 - 1	15 - 4	15 - 8	15 - 11
	24 0	3 - 8	4 - 6	5 - 2	5 - 10	6 - 4	6 - 10	7 - 4	7 - 9	8 - 3	8 - 7	9 - 0	9 - 4	9 - 9	10 - 1	10 - 5	10 - 8	11 - 0	11 - 4	11 - 7	11 - 11	12 - 2	12 - 5	12 - 9	13 - 0	13 - 3	13 - 6	13 - 9	14 - 0	14 - 3
2x10	12 0	6 - 7	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 1	14 - 10	15 - 6	16 - 3	16 - 11	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	21 - 6	22 - 0	22 - 6	22 - 11	23 - 5	23 - 11	24 - 4	24 - 9	-	-
	16 0	5 - 9	7 - 0	8 - 1	9 - 1	9 - 11	10 - 9	11 - 6	12 - 2	12 - 10	13 - 5	14 - 1	14 - 8	15 - 2	15 - 9	16 - 3	16 - 9	17 - 3	17 - 8	18 - 2	18 - 7	19 - 0	19 - 5	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 10	22 - 3
	19 2	5 - 3	6 - 5	7 - 5	8 - 3	9 - 1	9 - 10	10 - 6	11 - 1	11 - 9	12 - 3	12 - 10	13 - 4	13 - 10	14 - 4	14 - 10	15 - 3	15 - 9	16 - 2	16 - 7	17 - 0	17 - 4	17 - 9	18 - 2	18 - 6	18 - 11	19 - 3	19 - 7	19 - 11	20 - 3
	24 0	4 - 8	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 1	14 - 5	14 - 10	15 - 2	15 - 6	15 - 11	16 - 3	16 - 7	16 - 11	17 - 3	17 - 6	17 - 10	18 - 2
E	12 0	0 05	0 09	0 14	0 20	0 26	0 32	0 40	0 47	0 55	0 64	0 73	0 82	0 92	1 02	1 12	1 23	1 34	1 45	1 57	1 69	1 81	1 93	2 06	2 19	2 32	2 46	2 60	-	-
	16 0	0 04	0 08	0 12	0 17	0 22	0 28	0 34	0 41	0 48	0 55	0 63	0 71	0 80	0 88	0 97	1 06	1 16	1 26	1 36	1 46	1 57	1 67	1 78	1 90	2 01	2 13	2 25	2 37	2 49
	19 2	0 04	0 07	0 11	0 15	0 20	0 26	0 31	0 37	0 44	0 51	0 58	0 65	0 73	0 81	0 89	0 97	1 06	1 15	1 24	1 33	1 43	1 53	1 63	1 73	1 84	1 94	2 05	2 16	2 28
	24 0	0 04	0 06	0 10	0 14	0 18	0 23	0 28	0 33	0 39	0 45	0 52	0 58	0 65	0 72	0 79	0 87	0 95	1 03	1 11	1 19	1 28	1 37	1 46	1 55	1 64	1 74	1 84	1 94	2 04

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-21
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 20 psf plus
Dead Load of 20 psf determines the required bending design value
Deflection - For 20 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	3 - 2	3 - 11	4 - 6	5 - 1	5 - 6	6 - 0	6 - 5	6 - 9	7 - 2	7 - 6	7 - 10	8 - 2	8 - 5	8 - 9	9 - 0	9 - 4	9 - 7	9 - 10	10 - 1	10 - 4	10 - 7	10 - 10	11 - 1	11 - 4	11 - 6	11 - 9	11 - 11	12 - 2	12 - 4
	16 0	2 - 9	3 - 5	3 - 11	4 - 5	4 - 10	5 - 2	5 - 6	5 - 10	6 - 2	6 - 6	6 - 9	7 - 1	7 - 4	7 - 7	7 - 10	8 - 1	8 - 4	8 - 6	8 - 9	9 - 0	9 - 2	9 - 5	9 - 7	9 - 9	10 - 0	10 - 2	10 - 4	10 - 6	10 - 9
	19 2	2 - 6	3 - 1	3 - 7	4 - 0	4 - 5	4 - 9	5 - 1	5 - 4	5 - 8	5 - 11	6 - 2	6 - 5	6 - 8	6 - 11	7 - 2	7 - 4	7 - 7	7 - 9	8 - 0	8 - 2	8 - 5	8 - 7	8 - 9	8 - 11	9 - 1	9 - 3	9 - 5	9 - 7	9 - 9
	24 0	2 - 3	2 - 9	3 - 2	3 - 7	3 - 11	4 - 3	4 - 6	4 - 10	5 - 1	5 - 4	5 - 6	5 - 9	6 - 0	6 - 2	6 - 5	6 - 7	6 - 9	7 - 0	7 - 2	7 - 4	7 - 6	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 5	8 - 7	8 - 9
2x 6	12 0	5 - 0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 5	10 - 0	10 - 8	11 - 3	11 - 9	12 - 4	12 - 10	13 - 3	13 - 9	14 - 2	14 - 8	15 - 1	15 - 6	15 - 11	16 - 3	16 - 8	17 - 0	17 - 5	17 - 9	18 - 1	18 - 5	18 - 9	19 - 1	19 - 5
	16 0	4 - 4	5 - 4	6 - 2	6 - 11	7 - 6	8 - 2	8 - 8	9 - 3	9 - 9	10 - 2	10 - 8	11 - 1	11 - 6	11 - 11	12 - 4	12 - 8	13 - 1	13 - 5	13 - 9	14 - 1	14 - 5	14 - 9	15 - 1	15 - 4	15 - 8	16 - 0	16 - 3	16 - 7	16 - 10
	19 2	4 - 0	4 - 10	5 - 7	6 - 3	6 - 11	7 - 5	7 - 11	8 - 5	8 - 11	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 3	11 - 7	11 - 11	12 - 3	12 - 7	12 - 10	13 - 2	13 - 6	13 - 9	14 - 0	14 - 4	14 - 7	14 - 10	15 - 1	15 - 4
	24 0	3 - 7	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1	13 - 3	13 - 6	13 - 9
2x 8	12 0	6 - 7	8 - 1	9 - 4	10 - 6	11 - 6	12 - 5	13 - 3	14 - 0	14 - 10	15 - 6	16 - 3	16 - 10	17 - 6	18 - 2	18 - 9	19 - 4	19 - 10	20 - 5	20 - 11	21 - 5	21 - 11	22 - 5	22 - 11	23 - 5	23 - 10	24 - 4	24 - 9	25 - 2	25 - 8
	16 0	5 - 9	7 - 0	8 - 1	9 - 1	9 - 11	10 - 9	11 - 6	12 - 2	12 - 10	13 - 5	14 - 0	14 - 7	15 - 2	15 - 8	16 - 3	16 - 9	17 - 2	17 - 8	18 - 2	18 - 7	19 - 0	19 - 5	19 - 10	20 - 3	20 - 8	21 - 1	21 - 5	21 - 10	22 - 2
	19 2	5 - 3	6 - 5	7 - 5	8 - 3	9 - 1	9 - 9	10 - 6	11 - 1	11 - 8	12 - 3	12 - 10	13 - 4	13 - 10	14 - 4	14 - 10	15 - 3	15 - 8	16 - 2	16 - 7	16 - 11	17 - 4	17 - 9	18 - 2	18 - 6	18 - 10	19 - 3	19 - 7	19 - 11	20 - 3
	24 0	4 - 8	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3	16 - 7	16 - 10	17 - 2	17 - 6	17 - 10	18 - 2
2x10	12 0	8 - 5	10 - 4	11 - 11	13 - 4	14 - 8	15 - 10	16 - 11	17 - 11	18 - 11	19 - 10	20 - 8	21 - 6	22 - 4	23 - 2	23 - 11	24 - 7	25 - 4	26 - 0	-	-	-	-	-	-	-	-	-	-	-
	16 0	7 - 4	8 - 11	10 - 4	11 - 7	12 - 8	13 - 8	14 - 8	15 - 6	16 - 4	17 - 2	17 - 11	18 - 8	19 - 4	20 - 0	20 - 8	21 - 4	21 - 11	22 - 6	23 - 2	23 - 8	24 - 3	24 - 10	25 - 4	25 - 10	-	-	-	-	-
	19 2	6 - 8	8 - 2	9 - 5	10 - 7	11 - 7	12 - 6	13 - 4	14 - 2	14 - 11	15 - 8	16 - 4	17 - 0	17 - 8	18 - 3	18 - 11	19 - 6	20 - 0	20 - 7	21 - 1	21 - 8	22 - 2	22 - 8	23 - 2	23 - 7	24 - 1	24 - 6	25 - 0	25 - 5	25 - 10
	24 0	6 - 0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 11	22 - 4	22 - 9	23 - 2
E	12 0	0 04	0 08	0 12	0 16	0 21	0 27	0 33	0 39	0 46	0 53	0 60	0 68	0 76	0 84	0 93	1 02	1 11	1 20	1 30	1 40	1 50	1 60	1 71	1 82	1 93	2 04	2 15	2 27	2 39
	16 0	0 04	0 07	0 10	0 14	0 18	0 23	0 28	0 34	0 40	0 46	0 52	0 59	0 66	0 73	0 80	0 88	0 96	1 04	1 13	1 21	1 30	1 39	1 48	1 57	1 67	1 76	1 86	1 96	2 07
	19 2	0 03	0 06	0 09	0 13	0 17	0 21	0 26	0 31	0 36	0 42	0 48	0 54	0 60	0 67	0 73	0 80	0 88	0 95	1 03	1 10	1 18	1 27	1 35	1 44	1 52	1 61	1 70	1 79	1 89
	24 0	0 03	0 05	0 08	0 11	0 15	0 19	0 23	0 28	0 32	0 37	0 43	0 48	0 54	0 60	0 66	0 72	0 78	0 85	0 92	0 99	1 06	1 13	1 21	1 28	1 36	1 44	1 52	1 60	1 69

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-22
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 30 psf plus
Dead Load of 20 psf determines the required bending design value
Deflection - For 30 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12.0	2-10	3-6	4-0	4-6	4-11	5-4	5-9	6-1	6-5	6-8	7-0	7-3	7-7	7-10	8-1	8-4	8-7	8-10	9-0	9-3	9-6	9-8	9-11	10-1	10-4	10-6	10-8	10-11	11-1
	16.0	2-6	3-0	3-6	3-11	4-3	4-8	4-11	5-3	5-6	5-10	6-1	6-4	6-7	6-9	7-0	7-3	7-5	7-8	7-10	8-0	8-2	8-5	8-7	8-9	8-11	9-1	9-3	9-5	9-7
	19.2	2-3	2-9	3-2	3-7	3-11	4-3	4-6	4-10	5-1	5-4	5-6	5-9	6-0	6-2	6-5	6-7	6-9	7-0	7-2	7-4	7-6	7-8	7-10	8-0	8-2	8-4	8-5	8-7	8-9
	24.0	2-0	2-6	2-10	3-2	3-6	3-9	4-0	4-3	4-6	4-9	4-11	5-2	5-4	5-6	5-9	5-11	6-1	6-3	6-5	6-7	6-8	6-10	7-0	7-2	7-3	7-5	7-7	7-8	7-10
2x 6	12.0	4-6	5-6	6-4	7-1	7-9	8-5	9-0	9-6	10-0	10-6	11-0	11-5	11-11	12-4	12-8	13-1	13-6	13-10	14-2	14-7	14-11	15-3	15-7	15-11	16-2	16-6	16-10	17-1	17-5
	16.0	3-11	4-9	5-6	6-2	6-9	7-3	7-9	8-3	8-8	9-1	9-6	9-11	10-3	10-8	11-0	11-4	11-8	12-0	12-4	12-7	12-11	13-2	13-6	13-9	14-0	14-3	14-7	14-10	15-1
	19.2	3-7	4-4	5-0	5-7	6-2	6-8	7-1	7-6	7-11	8-4	8-8	9-1	9-5	9-9	10-0	10-4	10-8	10-11	11-3	11-6	11-9	12-0	12-4	12-7	12-10	13-1	13-3	13-6	13-9
	24.0	3-2	3-11	4-6	5-0	5-6	5-11	6-4	6-9	7-1	7-5	7-9	8-1	8-5	8-8	9-0	9-3	9-6	9-9	10-0	10-3	10-6	10-9	11-0	11-3	11-5	11-8	11-11	12-1	12-4
2x 8	12.0	5-11	7-3	8-4	9-4	10-3	11-1	11-10	12-7	13-3	13-11	14-6	15-1	15-8	16-3	16-9	17-3	17-9	18-3	18-9	19-2	19-8	20-1	20-6	20-11	21-4	21-9	22-2	22-6	22-11
	16.0	5-2	6-3	7-3	8-1	8-11	9-7	10-3	10-11	11-6	12-0	12-7	13-1	13-7	14-0	14-6	14-11	15-5	15-10	16-3	16-7	17-0	17-5	17-9	18-2	18-6	18-10	19-2	19-6	19-10
	19.2	4-8	5-9	6-7	7-5	8-1	8-9	9-4	9-11	10-6	11-0	11-6	11-11	12-5	12-10	13-3	13-8	14-0	14-5	14-10	15-2	15-6	15-10	16-3	16-7	16-10	17-2	17-6	17-10	18-2
	24.0	4-2	5-2	5-11	6-7	7-3	7-10	8-4	8-11	9-4	9-10	10-3	10-8	11-1	11-6	11-10	12-2	12-7	12-11	13-3	13-7	13-11	14-2	14-6	14-10	15-1	15-5	15-8	15-11	16-3
2x10	12.0	7-7	9-3	10-8	11-11	13-1	14-2	15-1	16-0	16-11	17-9	18-6	19-3	20-0	20-8	21-4	22-0	22-8	23-3	23-11	24-6	25-1	25-7	-	-	-	-	-	-	-
	16.0	6-6	8-0	9-3	10-4	11-4	12-3	13-1	13-11	14-8	15-4	16-0	16-8	17-4	17-11	18-6	19-1	19-7	20-2	20-8	21-2	21-8	22-2	22-8	23-2	23-7	24-0	24-6	24-11	25-4
	19.2	6-0	7-4	8-5	9-5	10-4	11-2	11-11	12-8	13-4	14-0	14-8	15-3	15-10	16-4	16-11	17-5	17-11	18-5	18-11	19-4	19-10	20-3	20-8	21-1	21-6	21-11	22-4	22-9	23-2
	24.0	5-4	6-6	7-7	8-5	9-3	10-0	10-8	11-4	11-11	12-6	13-1	13-7	14-2	14-8	15-1	15-7	16-0	16-6	16-11	17-4	17-9	18-1	18-6	18-11	19-3	19-7	20-0	20-4	20-8
E	12.0	0.04	0.08	0.12	0.17	0.23	0.29	0.35	0.42	0.49	0.57	0.65	0.73	0.82	0.91	1.00	1.09	1.19	1.29	1.39	1.50	1.61	1.72	1.83	1.95	2.07	2.19	2.31	2.43	2.56
	16.0	0.04	0.07	0.11	0.15	0.20	0.25	0.31	0.36	0.43	0.49	0.56	0.63	0.71	0.78	0.86	0.95	1.03	1.12	1.21	1.30	1.39	1.49	1.59	1.69	1.79	1.89	2.00	2.11	2.22
	19.2	0.03	0.06	0.10	0.14	0.18	0.23	0.28	0.33	0.39	0.45	0.51	0.58	0.65	0.72	0.79	0.86	0.94	1.02	1.10	1.19	1.27	1.36	1.45	1.54	1.63	1.73	1.83	1.92	2.03
	24.0	0.03	0.06	0.09	0.12	0.16	0.20	0.25	0.30	0.35	0.40	0.46	0.52	0.58	0.64	0.71	0.77	0.84	0.91	0.99	1.06	1.14	1.22	1.30	1.38	1.46	1.55	1.63	1.72	1.81

Note The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-23
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 40 psf plus
Dead Load of 20 psf determines the required bending design value
Deflection - For 40 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12.0	2 - 7	3 - 2	3 - 8	4 - 1	4 - 6	4 - 11	5 - 3	5 - 6	5 - 10	6 - 1	6 - 5	6 - 8	6 - 11	7 - 2	7 - 5	7 - 7	7 - 10	8 - 0	8 - 3	8 - 5	8 - 8	8 - 10	9 - 0	9 - 3	9 - 5	9 - 7	9 - 9	9 - 11	10 - 1
	16.0	2 - 3	2 - 9	3 - 2	3 - 7	3 - 11	4 - 3	4 - 6	4 - 10	5 - 1	5 - 4	5 - 6	5 - 9	6 - 0	6 - 2	6 - 5	6 - 7	6 - 9	7 - 0	7 - 2	7 - 4	7 - 6	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 5	8 - 7	8 - 9
	19.2	2 - 1	2 - 6	2 - 11	3 - 3	3 - 7	3 - 10	4 - 1	4 - 5	4 - 7	4 - 10	5 - 1	5 - 3	5 - 5	5 - 8	5 - 10	6 - 0	6 - 2	6 - 4	6 - 6	6 - 8	6 - 10	7 - 0	7 - 2	7 - 4	7 - 5	7 - 7	7 - 9	7 - 10	8 - 0
	24.0	1 - 10	2 - 3	2 - 7	2 - 11	3 - 2	3 - 5	3 - 8	3 - 11	4 - 1	4 - 4	4 - 6	4 - 8	4 - 11	5 - 1	5 - 3	5 - 5	5 - 6	5 - 8	5 - 10	6 - 0	6 - 1	6 - 3	6 - 5	6 - 6	6 - 8	6 - 9	6 - 11	7 - 0	7 - 2
2x 6	12.0	4 - 1	5 - 0	5 - 10	6 - 6	7 - 1	7 - 8	8 - 2	8 - 8	9 - 2	9 - 7	10 - 0	10 - 5	10 - 10	11 - 3	11 - 7	11 - 11	12 - 4	12 - 8	13 - 0	13 - 3	13 - 7	13 - 11	14 - 2	14 - 6	14 - 9	15 - 1	15 - 4	15 - 7	15 - 11
	16.0	3 - 7	4 - 4	5 - 0	5 - 7	6 - 2	6 - 8	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 1	9 - 5	9 - 9	10 - 0	10 - 4	10 - 8	10 - 11	11 - 3	11 - 6	11 - 9	12 - 0	12 - 4	12 - 7	12 - 10	13 - 1	13 - 3	13 - 6	13 - 9
	19.2	3 - 3	4 - 0	4 - 7	5 - 1	5 - 7	6 - 1	6 - 6	6 - 11	7 - 3	7 - 7	7 - 11	8 - 3	8 - 7	8 - 11	9 - 2	9 - 5	9 - 9	10 - 0	10 - 3	10 - 6	10 - 9	11 - 0	11 - 3	11 - 6	11 - 8	11 - 11	12 - 2	12 - 4	12 - 7
	24.0	2 - 11	3 - 7	4 - 1	4 - 7	5 - 0	5 - 5	5 - 10	6 - 2	6 - 6	6 - 10	7 - 1	7 - 5	7 - 8	7 - 11	8 - 2	8 - 5	8 - 8	8 - 11	9 - 2	9 - 5	9 - 7	9 - 10	10 - 0	10 - 3	10 - 5	10 - 8	10 - 10	11 - 0	11 - 3
2x 8	12.0	5 - 5	6 - 7	7 - 8	8 - 7	9 - 4	10 - 1	10 - 10	11 - 6	12 - 1	12 - 8	13 - 3	13 - 9	14 - 4	14 - 10	15 - 3	15 - 9	16 - 3	16 - 8	17 - 1	17 - 6	17 - 11	18 - 4	18 - 9	19 - 1	19 - 6	19 - 10	20 - 3	20 - 7	20 - 11
	16.0	4 - 8	5 - 9	6 - 7	7 - 5	8 - 1	8 - 9	9 - 4	9 - 11	10 - 6	11 - 0	11 - 6	11 - 11	12 - 5	12 - 10	13 - 3	13 - 8	14 - 0	14 - 5	14 - 10	15 - 2	15 - 6	15 - 10	16 - 3	16 - 7	16 - 10	17 - 2	17 - 6	17 - 10	18 - 2
	19.2	4 - 3	5 - 3	6 - 1	6 - 9	7 - 5	8 - 0	8 - 7	9 - 1	9 - 7	10 - 0	10 - 6	10 - 11	11 - 4	11 - 8	12 - 1	12 - 5	12 - 10	13 - 2	13 - 6	13 - 10	14 - 2	14 - 6	14 - 10	15 - 1	15 - 5	15 - 8	16 - 0	16 - 3	16 - 7
	24.0	3 - 10	4 - 8	5 - 5	6 - 1	6 - 7	7 - 2	7 - 8	8 - 1	8 - 7	9 - 0	9 - 4	9 - 9	10 - 1	10 - 6	10 - 10	11 - 2	11 - 6	11 - 9	12 - 1	12 - 5	12 - 8	12 - 11	13 - 3	13 - 6	13 - 9	14 - 0	14 - 4	14 - 7	14 - 10
2x10	12.0	6 - 11	8 - 5	9 - 9	10 - 11	11 - 11	12 - 11	13 - 9	14 - 8	15 - 5	16 - 2	16 - 11	17 - 7	18 - 3	18 - 11	19 - 6	20 - 1	20 - 8	21 - 3	21 - 10	22 - 4	22 - 10	23 - 5	23 - 11	24 - 5	24 - 10	25 - 4	25 - 10	-	-
	16.0	6 - 0	7 - 4	8 - 5	9 - 5	10 - 4	11 - 2	11 - 11	12 - 8	13 - 4	14 - 0	14 - 8	15 - 3	15 - 10	16 - 4	16 - 11	17 - 5	17 - 11	18 - 5	18 - 11	19 - 4	19 - 10	20 - 3	20 - 8	21 - 1	21 - 6	21 - 11	22 - 4	22 - 9	23 - 2
	19.2	5 - 5	6 - 8	7 - 9	8 - 7	9 - 5	10 - 2	10 - 11	11 - 7	12 - 2	12 - 9	13 - 4	13 - 11	14 - 5	14 - 11	15 - 5	15 - 11	16 - 4	16 - 10	17 - 3	17 - 8	18 - 1	18 - 6	18 - 11	19 - 3	19 - 8	20 - 0	20 - 5	20 - 9	21 - 1
	24.0	4 - 11	6 - 0	6 - 11	7 - 9	8 - 5	9 - 1	9 - 9	10 - 4	10 - 11	11 - 5	11 - 11	12 - 5	12 - 11	13 - 4	13 - 9	14 - 3	14 - 8	15 - 0	15 - 5	15 - 10	16 - 2	16 - 6	16 - 11	17 - 3	17 - 7	17 - 11	18 - 3	18 - 7	18 - 11
E	12.0	0.04	0.08	0.13	0.18	0.23	0.29	0.36	0.43	0.50	0.58	0.66	0.74	0.83	0.92	1.01	1.11	1.21	1.31	1.41	1.52	1.63	1.74	1.86	1.98	2.10	2.22	2.34	2.47	2.60
	16.0	0.04	0.07	0.11	0.15	0.20	0.25	0.31	0.37	0.43	0.50	0.57	0.64	0.72	0.80	0.88	0.96	1.05	1.13	1.22	1.32	1.41	1.51	1.61	1.71	1.82	1.92	2.03	2.14	2.25
	19.2	0.04	0.06	0.10	0.14	0.18	0.23	0.28	0.34	0.40	0.46	0.52	0.59	0.65	0.73	0.80	0.88	0.95	1.04	1.12	1.20	1.29	1.38	1.47	1.56	1.66	1.75	1.85	1.95	2.05
	24.0	0.03	0.06	0.09	0.13	0.16	0.21	0.25	0.30	0.35	0.41	0.46	0.52	0.59	0.65	0.72	0.78	0.85	0.93	1.00	1.08	1.15	1.23	1.31	1.40	1.48	1.57	1.66	1.75	1.84

Note: The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2.6 million psi and less, and is applicable to all lumber sizes shown. Spans are shown in feet-inches and are limited to 26' and less. Check sources of supply for availability of lumber in lengths greater than 20'.

TABLE R-24
RAFTERS WITH L/180 DEFLECTION LIMITATION

DESIGN CRITERIA
Strength - Live load of 50 psf plus
Dead Load of 20 psf determines the required bending design value
Deflection - For 50 psf live load
Limited to span in inches divided by 180

Rafter Size (in)	Spacing (in)	Bending Design Value, F_b, (psi)																												
		200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000
2x 4	12 0	2 - 5	2 - 11	3 - 5	3 - 10	4 - 2	4 - 6	4 - 10	5 - 1	5 - 5	5 - 8	5 - 11	6 - 2	6 - 5	6 - 7	6 - 10	7 - 0	7 - 3	7 - 5	7 - 8	7 - 10	8 - 0	8 - 2	8 - 4	8 - 6	8 - 8	8 - 10	9 - 0	9 - 2	9 - 4
	16 0	2 - 1	2 - 7	2 - 11	3 - 4	3 - 7	3 - 11	4 - 2	4 - 5	4 - 8	4 - 11	5 - 1	5 - 4	5 - 6	5 - 9	5 - 11	6 - 1	6 - 3	6 - 5	6 - 7	6 - 9	6 - 11	7 - 1	7 - 3	7 - 5	7 - 6	7 - 8	7 - 10	8 - 0	8 - 1
	19 2	1 - 11	2 - 4	2 - 8	3 - 0	3 - 4	3 - 7	3 - 10	4 - 1	4 - 3	4 - 6	4 - 8	4 - 10	5 - 1	5 - 3	5 - 5	5 - 7	5 - 9	5 - 11	6 - 0	6 - 2	6 - 4	6 - 6	6 - 7	6 - 9	6 - 11	7 - 0	7 - 2	7 - 3	7 - 5
	24 0	1 - 8	2 - 1	2 - 5	2 - 8	2 - 11	3 - 2	3 - 5	3 - 7	3 - 10	4 - 0	4 - 2	4 - 4	4 - 6	4 - 8	4 - 10	5 - 0	5 - 1	5 - 3	5 - 5	5 - 6	5 - 8	5 - 9	5 - 11	6 - 0	6 - 2	6 - 3	6 - 5	6 - 6	6 - 7
2x 6	12 0	3 - 10	4 - 8	5 - 4	6 - 0	6 - 7	7 - 1	7 - 7	8 - 1	8 - 6	8 - 11	9 - 4	9 - 8	10 - 0	10 - 5	10 - 9	11 - 1	11 - 5	11 - 8	12 - 0	12 - 4	12 - 7	12 - 10	13 - 2	13 - 5	13 - 8	13 - 11	14 - 2	14 - 5	14 - 8
	16 0	3 - 3	4 - 0	4 - 8	5 - 2	5 - 8	6 - 2	6 - 7	7 - 0	7 - 4	7 - 9	8 - 1	8 - 5	8 - 8	9 - 0	9 - 4	9 - 7	9 - 10	10 - 2	10 - 5	10 - 8	10 - 11	11 - 2	11 - 5	11 - 7	11 - 10	12 - 1	12 - 4	12 - 6	12 - 9
	19 2	3 - 0	3 - 8	4 - 3	4 - 9	5 - 2	5 - 7	6 - 0	6 - 4	6 - 9	7 - 0	7 - 4	7 - 8	7 - 11	8 - 3	8 - 6	8 - 9	9 - 0	9 - 3	9 - 6	9 - 9	9 - 11	10 - 2	10 - 5	10 - 7	10 - 10	11 - 0	11 - 3	11 - 5	11 - 7
	24 0	2 - 8	3 - 3	3 - 10	4 - 3	4 - 8	5 - 0	5 - 4	5 - 8	6 - 0	6 - 4	6 - 7	6 - 10	7 - 1	7 - 4	7 - 7	7 - 10	8 - 1	8 - 3	8 - 6	8 - 8	8 - 11	9 - 1	9 - 4	9 - 6	9 - 8	9 - 10	10 - 0	10 - 3	10 - 5
2x 8	12 0	5 - 0	6 - 2	7 - 1	7 - 11	8 - 8	9 - 4	10 - 0	10 - 7	11 - 2	11 - 9	12 - 3	12 - 9	13 - 3	13 - 8	14 - 2	14 - 7	15 - 0	15 - 5	15 - 10	16 - 3	16 - 7	17 - 0	17 - 4	17 - 8	18 - 0	18 - 5	18 - 9	19 - 1	19 - 5
	16 0	4 - 4	5 - 4	6 - 2	6 - 10	7 - 6	8 - 1	8 - 8	9 - 2	9 - 8	10 - 2	10 - 7	11 - 1	11 - 6	11 - 10	12 - 3	12 - 8	13 - 0	13 - 4	13 - 8	14 - 0	14 - 4	14 - 8	15 - 0	15 - 4	15 - 7	15 - 11	16 - 3	16 - 6	16 - 9
	19 2	3 - 11	4 - 10	5 - 7	6 - 3	6 - 10	7 - 5	7 - 11	8 - 5	8 - 10	9 - 3	9 - 8	10 - 1	10 - 6	10 - 10	11 - 2	11 - 6	11 - 10	12 - 2	12 - 6	12 - 10	13 - 1	13 - 5	13 - 8	14 - 0	14 - 3	14 - 6	14 - 10	15 - 1	15 - 4
	24 0	3 - 6	4 - 4	5 - 0	5 - 7	6 - 2	6 - 7	7 - 1	7 - 6	7 - 11	8 - 4	8 - 8	9 - 0	9 - 4	9 - 8	10 - 0	10 - 4	10 - 7	10 - 11	11 - 2	11 - 6	11 - 9	12 - 0	12 - 3	12 - 6	12 - 9	13 - 0	13 - 3	13 - 6	13 - 8
2x10	12 0	6 - 5	7 - 10	9 - 0	10 - 1	11 - 1	11 - 11	12 - 9	13 - 6	14 - 3	15 - 0	15 - 8	16 - 3	16 - 11	17 - 6	18 - 1	18 - 7	19 - 2	19 - 8	20 - 2	20 - 8	21 - 2	21 - 8	22 - 1	22 - 7	23 - 0	23 - 5	23 - 11	24 - 4	24 - 9
	16 0	5 - 6	6 - 9	7 - 10	8 - 9	9 - 7	10 - 4	11 - 1	11 - 9	12 - 4	13 - 0	13 - 6	14 - 1	14 - 8	15 - 2	15 - 8	16 - 1	16 - 7	17 - 0	17 - 6	17 - 11	18 - 4	18 - 9	19 - 2	19 - 7	19 - 11	20 - 4	20 - 8	21 - 1	21 - 5
	19 2	5 - 1	6 - 2	7 - 2	8 - 0	8 - 9	9 - 5	10 - 1	10 - 8	11 - 3	11 - 10	12 - 4	12 - 10	13 - 4	13 - 10	14 - 3	14 - 9	15 - 2	15 - 7	15 - 11	16 - 4	16 - 9	17 - 1	17 - 6	17 - 10	18 - 2	18 - 6	18 - 11	19 - 3	19 - 7
	24 0	4 - 6	5 - 6	6 - 5	7 - 2	7 - 10	8 - 5	9 - 0	9 - 7	10 - 1	10 - 7	11 - 1	11 - 6	11 - 11	12 - 4	12 - 9	13 - 2	13 - 6	13 - 11	14 - 3	14 - 8	15 - 0	15 - 4	15 - 8	15 - 11	16 - 3	16 - 7	16 - 11	17 - 2	17 - 6
E	12 0	0 04	0 08	0 13	0 18	0 23	0 29	0 35	0 42	0 50	0 57	0 65	0 74	0 82	0 91	1 00	1 10	1 20	1 30	1 40	1 51	1 62	1 73	1 84	1 96	2 08	2 20	2 32	2 45	2 58
	16 0	0 04	0 07	0 11	0 15	0 20	0 25	0 31	0 37	0 43	0 50	0 56	0 64	0 71	0 79	0 87	0 95	1 04	1 12	1 21	1 31	1 40	1 50	1 60	1 70	1 80	1 91	2 01	2 12	2 23
	19 2	0 04	0 06	0 10	0 14	0 18	0 23	0 28	0 33	0 39	0 45	0 52	0 58	0 65	0 72	0 79	0 87	0 95	1 03	1 11	1 19	1 28	1 37	1 46	1 55	1 64	1 74	1 84	1 94	2 04
	24 0	0 03	0 06	0 09	0 12	0 16	0 21	0 25	0 30	0 35	0 40	0 46	0 52	0 58	0 64	0 71	0 78	0 85	0 92	0 99	1 07	1 14	1 22	1 30	1 39	1 47	1 56	1 64	1 73	1 82

Note The required modulus of elasticity, E, in 1,000,000 pounds per square inch is shown at the bottom of each table, is limited to 2 6 million psi and less, and is applicable to all lumber sizes shown Spans are shown in feet-inches and are limited to 26' and less Check sources of supply for availability of lumber in lengths greater than 20'

APPENDIX A - COMMENTARY

A.1 Floor Joists

A.1.1 Floor Joists with L/360 Deflection Limitations

Tables F-1 through F-7 list spans for floor joists, used over a single span, with calculations based on modulus of elasticity, E, and the required bending design values, F_b, shown. Floor joist spans are determined based on a deflection limitation of L/360, where L is the span in inches. The deflection equation for a simple span beam with uniformly distributed load is:

$$\Delta_{max} = \frac{5wL^4}{384EI} \qquad \textbf{[Eq. A.1-1]}$$

Since $\Delta_{max} \leq L/360$ this equation can be rewritten to solve for L as follows:

$$L = \sqrt[3]{\frac{384EI}{5w(360)}} \qquad \textbf{[Eq. A.1-2]}$$

The uniform load, w, is based on the live load and joist spacing. The moment of inertia, I, is based on the joist size.

The required bending design value, F_b, is determined based on the calculated span. Note that the maximum moment, M_{max}, of a single span beam with uniform load is calculated as:

$$M_{max} = \frac{w\,L^2}{8} \qquad \textbf{[Eq. A.1-3]}$$

where the uniform load, w, is based on the total dead plus live load and joist spacing. The actual bending stress in a beam is calculated as $f_b = M/S$ where S is the section modulus of the joist. The allowable bending design value, F_b, is based on a fully supported member, properly sheathed and nailed on the top edge of the joist. Since the actual stress must be less than the allowable bending design value, F_b, the allowable bending design value can be calculated as:

$$F_b = \frac{w\,L^2}{8\,S} \qquad \textbf{[Eq. A.1-4]}$$

A.1.2 Floor Joists with L/480 or L/600 Deflection Limitations

Most codes require a minimum deflection limitation of L/360 for floor joists. In cases where a stricter deflection limit is desired, and the length shown is controlled by the L/360 deflection limit, the tabulated span lengths may be adjusted by the factors shown as follows:

Deflection Limit	Adjustment Factor
L/480	0.91
L/600	0.84

A.1.3 Two-Span Floor Joists

Tables F-1 through F-7 list spans based on floor joists with a uniform load over one span. Calculations are based on E with required F_b values shown. Note that a uniform live load acting on equal spans of a continuous two-span joist will create less deflection and stress than an identical uniform load acting on a single span joist. Therefore, Tables F-1 through F-7 may conservatively be used for continuous, two-span joists supporting a uniform load. Note also that the required compression design value perpendicular to grain at the center support will be twice that required for a single span joist as shown in Table 9.1.

A.2 Ceiling Joists

Tables C-1 and C-2 list spans for ceiling joists used over a single span with calculations based on E and the required F_b values shown. The spans and required bending design values are determined from the same equations for a single span, uniformly loaded beam as shown above for single span floor joists. The only difference in design criteria is L/240 deflection limitations for ceiling joists supporting drywall ceilings which are typically required by building codes. The allowable bending design value, F_b, is based on a fully supported member, properly sheathed and nailed on one edge of the joist.

A.3 Rafters

A.3.1 Rafters with L/240 Deflection Limitations

Tables R-1 through R-12 list spans for rafters with deflection limitations of L/240, used over a single span with calculations based on F_b values and the required E values shown. The allowable bending design value, F_b, is based on a fully supported member, properly sheathed and nailed on the top edge of the rafter. Generally, a deflection limitation of L/240 applies to rafters with a drywall ceiling attached to the underside (e.g., cathedral ceilings).

The maximum moment for a single span beam with a uniform load is defined above. This equation can be rewritten to solve for L as follows:

$$L = \sqrt{\frac{8 F_b S}{w}} \qquad \textbf{[Eq. A.3.1-1]}$$

The uniform load, w, is based on the total dead plus live load and joist spacing.

The required modulus of elasticity, E, is determined based on this calculated span as follows:

$$E = \frac{5wL^3(240)}{384\, I} \qquad \textbf{[Eq. A.3.1-2]}$$

The uniform load, w, is based on the live load and joist spacing.

A.3.2 Rafters with L/180 Deflection Limitations

Tables R-13 through R-24 list spans for rafters with deflection limitations of L/180, used over a single span with calculations based on F_b values and the required E values shown. Calculations for span and required modulus of elasticity are the same as those for single span beams with deflection limitations of L/240, except that 180 is substituted for 240 in the numerator of Equation A.3.1-2. Generally, a deflection limitation of L/180 applies to rafters without a drywall ceiling attached to the underside. Some governing building codes also consider the slope of the rafter in determining deflection limitations, and only allow L/180 deflection limitations for rafters with slopes greater than 3 in 12 and no ceiling attached.

A.3.3 Roof Loads

Section 6 outlines adjustment factors for determining rafter spans and required E values for roof live loads of 12 psf or 16 psf. The tabulated spans are modified by the square root of the ratio of the total uniform load at 20 psf and the total uniform load at the reduced level (12 or 16 psf). This is based on Equation A.3.1-1 which is used to calculate the span of a rafter based on the square root of the total uniform load.

The E values are adjusted based on the modified span as noted above and the uniform live load ratio. Based on Equation A.3.1-2:

$$\frac{E_2}{E_1} = \left(\frac{w_2}{w_1}\right)\left(\frac{L_2}{L_1}\right)^3 \qquad \textbf{[Eq. A.3.3-1]}$$

$$= \left(\frac{LL_2}{LL_1}\right)\left(\frac{LL_1+DL_1}{LL_2+DL_2}\right)^{3/2} \qquad \textbf{[Eq. A.3.3-2]}$$

where subscript 1 denotes variables associated with the 20 psf uniform live load and subscript 2 denotes variables associated with the uniform live load at the reduced level. LL is the uniform live load and DL is the uniform dead load. All other variables are as previously defined in A.3.

A.4 Compression Perpendicular to Grain Design Requirements

Compression perpendicular to grain is also a design consideration for joists and rafters. Required compression perpendicular to grain design values are tabulated in Table 9.1. These values are calculated assuming a bearing width of 1.5", a total load of 66.67 plf, and the calculated span. The 66.67 plf total load is based on a 40 psf live load and 10 psf dead load on joists at 16" on center, which is a typical condition of use. Alternate $F_{c\perp}$ values are possible by adjusting the tabulated values in direct proportion to the desired load. Adjustment factors for various loads and spacings are tabulated in Table 9.2 for convenience. Required compression design values perpendicular to grain are also applicable to bearing plates.

A.5 Lumber Design Values

The spans for nominal 2x5 joists or rafters are 82 percent of the spans tabulated for the same spacing of nominal 2x6 joists or rafters. For each joist or rafter spacing, the values of E for 2x5's are the same as the tabulated E values for 2x6's. The values of F_b for 2x5's shall be determined by multiplying the tabulated F_b values for 2x6's by 1.077.

A.6 Load Requirements

Applicable design criteria for each condition of use appear at the top of each table. While these criteria are directed principally to residential construction they are suitable for other occupancies having similar conditions of loading. Examples include, but are not limited to, assembly areas with fixed seats, cornices, fire escapes for single family residential buildings, cell blocks of penal institutions, multiple family dwelling units and hotel guest rooms. Check governing building code requirements for other applicable occupancies. Tabulated spans for rafters also apply to other types of occupancy, since the occupancy has little bearing on roof loading.

The live and dead load requirements are based on various common loading conditions. The following tables (Tables A-1, A-2, A-3, and A-4) are intended to provide guidance regarding the type of material or occupancy that might create the loads in each span table. Tables A-1, A-2, A-3, and A-4 are intended as a guide only and are superseded by the governing building code in the applicable jurisdiction.

A.7 Support Requirements

Adequate support shall be provided for all joists and rafters. Ridge beams shall be installed at roof peaks, and rafters shall bear directly on the ridge beam or be supported by hangers or framing anchors. Ceiling joists shall not be required when properly designed ridge beams are used.

A ridge board shall be permitted to be substituted for a ridge beam when the roof slope equals or exceeds 3 in 12, except that ridge beams shall be required for cathedral ceilings. Ridge boards shall be at least 1 inch nominal in thickness and not less than the depth of the cut end of the rafter. Rafters shall be placed directly opposite each other, and ceiling joists shall be installed parallel with rafters to provide a continuous tie between exterior walls.

A.8 Repetitive Member Use

Repetitive member use is that condition where framing members such as joists, rafters, studs, planks, decking, or similar members are in contact or spaced not more than 24 inches on-center, are not less than 3 in number, and are joined by floor, roof, or other load-distributing elements adequate to support the design load. Bending design values (F_b) for such use are 15 percent greater than for single-member use. Tables W-1 and W-2 of *Design Values for Joists and Rafters*, a supplement to these tables, provide bending design values for repetitive member use of joists and rafters.

A.9 Load Duration

For joists and rafters, bending design values (F_b) are adjusted for load duration by the following factors:

1.00 for 10 years (normal) duration, as for occupancy live load,

1.15 for 2 months duration, as for snow,

1.25 for 7 days duration, as for construction loading.

Tables W-1 and W-2 of *Design Values for Joists and Rafters*, a supplement to these tables, provide bending design values for repetitive member use of joists and rafters under 10 years (normal), 2 months, and 7 days load duration.

A.10 Use of the Span Tables

Spans for floor and ceiling joists are calculated on the basis of the modulus of elasticity (E) with the required bending design value (F_b) listed below each span. Spans for rafters are calculated on the basis of bending design values (F_b) with the required modulus of elasticity (E) listed below each span. Required compression perpendicular to grain design values ($F_{c\perp}$) are tabulated based on span and bearing length with adjustments for different loading and on-center spacings. Use of the tables is illustrated in the examples which follow. Values determined from the span tables should be compared to values from Tables W-1 and W-2 of *Design Values for Joists and Rafters*. Species and grades with design values greater than or equal to those shown in the span tables are appropriate.

Table A-1. FLOOR JOISTS WITH L/360 DEFLECTION LIMITATIONS

Table No.	Live Load (psf)	Dead[1] Load (psf)	Material or Occupancy
F-1	30	10	All rooms used for sleeping areas and attic floors
F-2	40	10	Decks and all rooms except those used for sleeping areas and attic floors
F-3	50	10	Office space (concentrated load checks may be required)
F-4	60	10	Decks or corridors
F-5	40	20	All rooms, except those used for sleeping areas and attic floors, with 1.5" or less lightweight concrete floor fill, or with ceramic tile or stone installation methods weighing no more than 10 psf with no lightweight concrete floor fill
F-6	50	20	Office space (concentrated load checks may be required) with 1.5" or less lightweight concrete floor fill, or with ceramic tile or stone installation methods weighing no more than 10 psf with no lightweight concrete floor fill
F-7	60	20	Decks or corridors with 1.5" or less lightweight concrete floor fill, or with ceramic tile or stone installation methods weighing no more than 10 psf with no lightweight concrete floor fill

1. Dead load includes the weight of the framing members.

Table A-2. CEILING JOISTS WITH L/240 DEFLECTION LIMITATIONS

Table No.	Live Load (psf)	Dead[1] Load (psf)	Material or Occupancy
C-1	10	5	Drywall ceiling attached, no attic storage
C-2	20	10	Drywall ceiling attached, limited attic storage where development of future rooms is not possible

1. Dead load includes the weight of the framing members.

Example 1. Floor Joists

Assume a required single span of 12'-9", a live load of 40 psf, dead load of 10 psf and joists spaced 16 inches on centers. Table F-2 shows that a grade of 2x8 having an E value of 1,600,000 psi and an F_b value of 1255 psi would have a span of 12'-10", which satisfies the condition. Assuming a 2" bearing length, Table 9.1 shows 156 psi for $F_{c\perp}$ at a 14' span. Table 9.2 shows an adjustment factor of 1.0. The grade of 2x8 would also need an $F_{c\perp}$ value greater than 156 psi.

Example 2. Rafters

Assume a horizontal projection span of 13'-0", a live load of 20 psf, dead load of 10 psf, L/240 deflection limitation and rafters spaced 16 inches on centers. Table R-1 shows that a 2x6 having an F_b value of 1400 psi and an E value of 1,350,000 psi would have a span of 13'-3" of horizontal projection. Conversion of horizontal to sloping distance is illustrated on page A-7. Table 9.1 shows a required $F_{c\perp}$ value of 89 psi assuming a 3.5" bearing length. Table 9.2 allows that to be adjusted by a factor of 0.60, which equals 53 psi. The grade of 2x6 would need an $F_{c\perp}$ value greater than 53 psi.

Table A-3. RAFTERS WITH L/240 DEFLECTION LIMITATIONS
(Drywall ceiling attached to underside of rafter)

Table No.	Live Load (psf)	Dead[1] Load (psf)	Material or Occupancy
R-1	20	10	Light roof (1 course of asphalt shingles)
R-2	30	10	Light roof (1 course of asphalt shingles)
R-3	40	10	Light roof (1 course of asphalt shingles)
R-4	50	10	Light roof (1 course of asphalt shingles)
R-5	20	15	Medium roof covering (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-6	30	15	Medium roof covering (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-7	40	15	Medium roof covering (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-8	50	15	Medium roof covering (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-9	20	20	Heavy roof covering (2" clay book tile)
R-10	30	20	Heavy roof covering (2" clay book tile)
R-11	40	20	Heavy roof covering (2" clay book tile)
R-12	50	20	Heavy roof covering (2" clay book tile)

1. Dead load includes the weight of the framing members, wood structural panels, gypsum, and insulation.

Table A-4. RAFTERS WITH L/180 DEFLECTION LIMITATIONS
(No drywall ceiling attached to underside of rafter)

Table No.	Live Load (psf)	Dead[1] Load (psf)	Material or Occupancy
R-13	20	10	Light roof (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-14	30	10	Light roof (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-15	40	10	Light roof (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-16	50	10	Light roof (up to 2 courses of asphalt shingles, or wood shakes/shingles)
R-17	20	15	Medium roof covering (up to 1/4" slate)
R-18	30	15	Medium roof covering (up to 1/4" slate)
R-19	40	15	Medium roof covering (up to 1/4" slate)
R-20	50	15	Medium roof covering (up to 1/4" slate)
R-21	20	20	Heavy roof covering (2" clay book tile)
R-22	30	20	Heavy roof covering (2" clay book tile)
R-23	40	20	Heavy roof covering (2" clay book tile)
R-24	50	20	Heavy roof covering (2" clay book tile)

1. Dead load includes the weight of the framing members and wood structural panels.

Example 3. Two-span Floor Joists. Assume two floor systems are required to span 12' rooms on either side of a 6' corridor. The rooms require a 40 psf live load and the corridor requires an 80 psf live load. All spans require a 10 psf dead load. Table F-2 shows a 2x12 at 16" on-center with E=1,200,000 psi and F_b=1036 psi will span 18'-1". By overlapping these joists across the corridor, as shown in Figure A.10-1, a spacing of 8" on-center will be achieved on the corridor, which effectively carries twice the live load. This provides adequate support for the required 80 psf live load across the corridor. Table 9.1 shows a required $F_{c\perp}$ value of 114 psi assuming a 3.5" bearing length. Doubling this value in accordance with A.1.3 gives 228. Table 9.2 shows an adjustment factor of 1.0. The grade of 2x12 would need an $F_{c\perp}$ value greater than 228 psi.

Since many combinations of size, spacing, E, F_b, and $F_{c\perp}$ values are possible, the user should examine the tables to determine which combination fits the particular case most effectively.

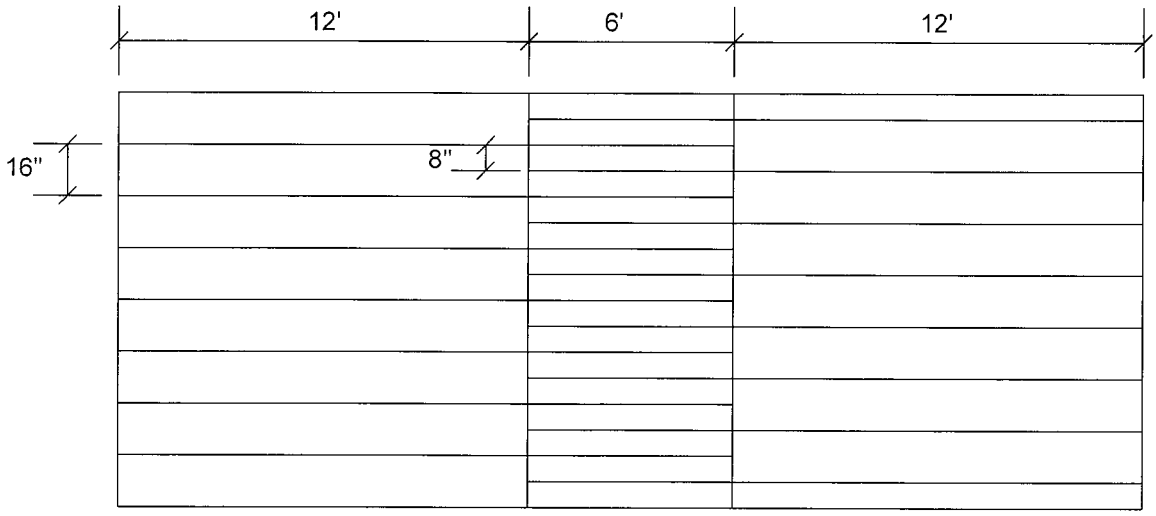
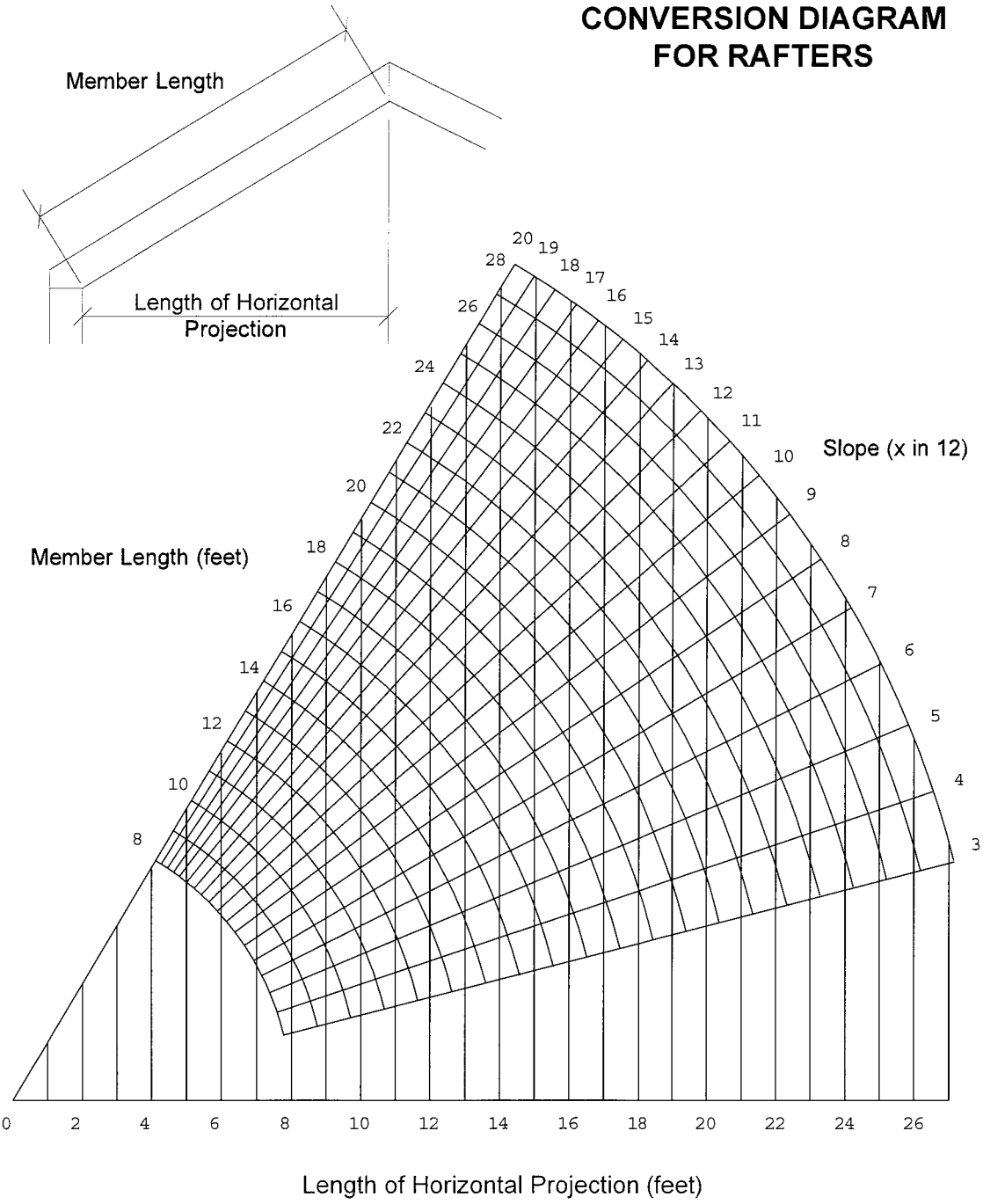


Figure A.10-1 Two-span floor joists overlap at interior span to double load-carrying capacity of the floor system for the corridor.

CONVERSION DIAGRAM FOR RAFTERS



To use the diagram, select the known horizontal distance and follow the vertical line to its intersection with the radial line of the specified slope, then proceed along the arc to read the sloping distance. Interpolation is appropriate between the one foot increments. The diagram also gives the horizontal distance corresponding to a given sloping distance or the slope when the horizontal and sloping distances are known.

Example: With a roof slope of 8 in 12 and a horizontal distance of 20 feet the sloping distance is read as 24 feet.

-NOTES-

American Wood Council

AWC Mission Statement

To increase the use of wood by assuring the broad regulatory acceptance of wood products, developing design tools and guidelines for wood construction, and influencing the development of public policies affecting the use and manufacture of wood products.

American Wood Council
222 Catoctin Circle, SE, Suite 201
Leesburg, VA 20175
info@awc.org
www.awc.org

05-15

B.O.R.A. Appeal of Town of Davie Building Official William Diaz
Actions / Determinations related to Town of Davie Permit # 2024-6024 – Exhibit 'B'.
101700238

1605.1.1 Stability. Regardless of which load combinations are used to design for strength, where overall structure stability (such as stability against overturning, sliding, or buoyancy) is being verified, use of the load combinations specified in ASCE 7, Section 2.3, ASCE 7, Section 2.4, and in Section 1605.2 shall be permitted. Where the load combinations specified in ASCE 7, Section 2.3 are used, strength reduction factors applicable to soil resistance shall be provided by a *registered design professional*. The stability of retaining walls shall be verified in accordance with Section 1807.2.3.

1605.2 Alternative allowable stress design load combinations. In lieu of the load combinations in ASCE 7, Section 2.4, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following combinations. Where using these alternative allowable stress load combinations that include wind *load*, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards. For *load* combinations that include the counteracting effects of dead and wind *loads*, only two-thirds of the minimum *dead load* likely to be in place during a design wind event shall be used. Where using these alternative *load* combinations to evaluate sliding, overturning and soil bearing at the soil-structure interface, the reduction of foundation overturning from Section 12.13.4 in ASCE 7 shall not be used.

$D + L + (L_r \text{ or } R)$ **(Equation 16-1)**

$D + L + 0.6W$ **(Equation 16-2)**

$D + L + 0.6W$ **(Equation 16-3)**

$D + L + 0.6W/2$ **(Equation 16-4)**

$D + L$ **(Equation 16-5)**

$0.9D$ **(Equation 16-6)**

Exception: Crane hook *loads* need not be combined with roof *live loads* or one-half of the wind *load*.

SECTION 1606
DEAD LOADS

1606.1 General. *Dead loads* are those *loads* defined in Chapter 2 of this code. *Dead loads* shall be considered permanent *loads*.

1606.2 Weights of materials of construction. For purposes of design, the actual weights of materials of construction shall be used. In the absence of definite information, values used shall be subject to the approval of the *building official*.

1606.3 Weight of fixed service equipment. In determining *dead loads* for purposes of design, the weight of fixed service equipment, including the maximum weight of the contents of fixed service equipment, shall be included. The components of fixed service equipment that are variable, such as liquid contents and movable trays, shall not be used to counteract forces causing overturning, sliding, and uplift conditions in accordance with Section 1.3.6 of ASCE 7.

Exception: Where force effects are the result of the presence of the variable components, the components are permitted to be used to counter those *load effects*. In such cases, the structure shall be designed for force effects with the variable components present and with them absent.

1606.4 Photovoltaic panel systems. The weight of *photovoltaic panel systems*, their support system, and ballast shall be considered as *dead load*.

1606.5 Vegetative and landscaped roofs. The weight of all landscaping and hardscaping materials for vegetative and landscaped roofs shall be considered as *dead load*. The weight shall be computed considering both fully saturated soil and drainage layer materials and fully dry soil and drainage layer materials to determine the most severe *load effects* on the structure.

SECTION 1607
LIVE LOADS

1607.1 General. *Live loads* are those *loads* defined in Chapter 2 of this code.

1607.2 Loads not specified. For occupancies or uses not designated in Section 1607, the *live load* shall be determined in accordance with a method *approved* by the *building official*.

1607.3 Uniform live loads. The *live loads* used in the design of buildings and other structures shall be the maximum *loads* expected by the intended use or occupancy but shall in no case be less than the minimum uniformly distributed *live loads* given in Table 1607.1.

1607.4 Concentrated live loads. Floors, roofs and other similar surfaces shall be designed to support the uniformly distributed *live loads* prescribed in Section 1607.3 or the concentrated *live loads*, given in Table 1607.1, whichever produces the greater *load effects*. Unless otherwise specified, the indicated concentration shall be assumed to be uniformly distributed over an area of $2^1/_2$ feet by $2^1/_2$ feet (762 mm by 762 mm) and shall be located so as to produce the maximum *load effects* in the structural members.

1607.5 Partition loads. In office buildings and in other buildings where partition locations are subject to change, provisions for partition weight shall be made, whether or not partitions are shown on the construction documents, unless the specified *live load* is 80 psf (3.83 kN/m^2) or greater. The partition *load* shall be not less than a uniformly distributed *live load* of 15 psf (0.72 kN/m^2).

1607.6 Helipads. Helipads shall be designed for the following *live loads*:

1. A uniform *live load, L*, as specified below. This *load* shall not be reduced.
   1.1. 40 psf (1.92 kN/m^2) where the design basis helicopter has a maximum take-off weight of 3,000 pounds (13.35 kN) or less.
   1.2. 60 psf (2.87 kN/m^2) where the design basis helicopter has a maximum take-off weight greater than 3,000 pounds (13.35 kN).
2. A single concentrated *live load, L*, of 3,000 pounds (13.35 kN) applied over an area of 4.5 inches by 4.5 inches (114 mm by 114 mm) and located so as to pro-

INTERNATIONAL CODE COUNCIL®
106
Copyright © 2023 ICC. ALL RIGHTS RESERVED. Access by Alex Choury (alex@artisticdevelopment.com), (-) Order Number #101700238 on Jan 11, 2024 12:30 PM (CST) pursuant to License Agreement with ICC. No further reproduction, no further reproductions by any third party, or distribution authorized. Single user only, copying and networking prohibited. ANY UNAUTHORIZED REPRODUCTION OR DISTRIBUTION IS A VIOLATION OF THE FEDERAL COPYRIGHT ACT AND THE LICENSE AGREEMENT, AND SUBJECT TO CIVIL AND CRIMINAL PENALTIES THEREUNDER.

101700238

duce the maximum *load effects* on the structural elements under consideration. The concentrated *load* is not required to act concurrently with other uniform or concentrated *live loads*.

3. Two single concentrated *live loads*, *L*, 8 feet (2438 mm) apart applied on the landing pad (representing the helicopter's two main landing gear, whether skid type or wheeled type), each having a magnitude of 0.75 times the maximum take-off weight of the helicopter, and located so as to produce the maximum *load effects* on the structural elements under consideration. The concentrated *loads* shall be applied over an area of 8 inches by 8 inches (203 mm by 203 mm) and are not required to act concurrently with other uniform or concentrated *live loads*.

Landing areas designed for a design basis helicopter with maximum take-off weight of 3,000-pounds (13.35 kN) shall be identified with a 3,000 pound (13.34 kN) weight limitation. The landing area weight limitation shall be indicated by the numeral "3" (kips) located in the bottom right corner of the landing area as viewed from the primary approach path. The indication for the landing area weight limitation shall be a minimum 5 feet (1524 mm) in height.

1607.7 Passenger vehicle garages. Floors in garages or portions of a building used for the storage of motor vehicles shall be designed for the uniformly distributed *live loads* indicated in Table 1607.1 or the following concentrated *load*:

1. For garages restricted to passenger vehicles accommodating not more than nine passengers, 3,000 pounds (13.35 kN) acting on an area of 4.5 inches by 4.5 inches(114 mm by 114 mm).
2. For mechanical parking structures without slab or deck that are used for storing passenger vehicles only, 2,250 pounds (10 kN) per wheel.

1607.8 Heavy vehicle loads. Floors and other surfaces that are intended to support vehicle *loads* greater than a 10,000-pound (4536 kg) gross vehicle weight rating shall comply with Sections 1607.8.1 through 1607.8.5.

1607.8.1 Loads. Where any structure does not restrict access for vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, those portions of the structure subject to such *loads* shall be designed using the vehicular *live loads*, including consideration of impact and fatigue, in accordance with the codes and specifications required by the jurisdiction having authority for the design and construction of the roadways and bridges in the same location of the structure.

1607.8.2 Fire truck and emergency vehicles. Where a structure or portions of a structure are accessed and loaded by fire department access vehicles and other similar emergency vehicles, the structure shall be designed for the greater of the following *loads*:

1. The actual operational *loads*, including outrigger reactions and contact areas of the vehicles as stipulated and approved by the *building official*; or
2. The live loading specified in Section 1607.8.1.

1607.8.3 Heavy vehicle garages. Garages designed to accommodate vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, shall be designed using the live loading specified by Section 1607.8.1. For garages the design for impact and fatigue is not required.

Exception: The vehicular *live loads* and load placement are allowed to be determined using the actual vehicle weights for the vehicles allowed onto the garage floors, provided such *loads* and placement are based on rational engineering principles and are approved by the building official, but shall not be less than 50 psf (2.9 kN/m^2). This *live load* shall not be reduced.

1607.8.4 Forklifts and movable equipment. Where a structure is intended to have forklifts or other movable equipment present, the structure shall be designed for the total vehicle or equipment *load* and the individual wheel loads for the anticipated vehicles as specified by the owner of the facility. These *loads* shall be posted in accordance with Section 1607.8.5.

1607.8.4.1 Impact and fatigue. Impact *loads* and fatigue loading shall be considered in the design of the supporting structure. For the purposes of design, the vehicle and wheel *loads* shall be increased by 30 percent to account for impact.

1607.8.5 Posting. The maximum weight of vehicles allowed into or on a garage or other structure shall be posted by the owner or the owner's authorized agent in accordance with Section 106.1.

1607.9 Loads on handrails, guards, grab bars and seats. Handrails and guards shall be designed and constructed for the structural loading conditions set forth in Section 1607.9.1. Grab bars, shower seats and accessible benches shall be designed and constructed for structural loading conditions set forth in Section 1607.9.2.

1607.9.1 Handrails and guards. Handrails and *guards* shall be designed to resist a linear load of 50 pounds per linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1 of ASCE 7. Glass handrail assemblies and *guards* shall also comply with Section 2407.

Exceptions:

1. For one- and two-family dwellings, only the single concentrated load required by Section 1607.9.1.1 shall be applied.
2. In Group I-3, F, H and S occupancies, for areas that are not accessible to the general public and that have an *occupant load* less than 50, the minimum load shall be 20 pounds per foot (0.29 kN/m).

1607.9.1.1 Concentrated load. Handrails and guards shall be designed to resist a concentrated load of 200 pounds (0.89 kN) in accordance with Section 4.5.1 of ASCE 7.

1607.9.1.2 Guard component loads. Balusters, panel fillers, and guard infill components, including all rails except the handrail and the top rail, shall be designed to resist a concentrated *load* of 50 pounds (0.22 kN) in accordance with Section 4.5.1.2 of ASCE 7.

INTERNATIONAL CODE COUNCIL® 107
Copyright © 2023 ICC. ALL RIGHTS RESERVED. Access by Alex Khoury (alex@artisticdevelopment.com), (-) Order Number #101700238 on Jan 11, 2024 12:30 PM (CST) pursuant to License Agreement with ICC. No further reproduction, no further reproductions by any third party, or distribution authorized. Single user only, copying and networking prohibited. ANY UNAUTHORIZED REPRODUCTION OR DISTRIBUTION IS A VIOLATION OF THE FEDERAL COPYRIGHT ACT AND THE LICENSE AGREEMENT, AND SUBJECT TO CIVIL AND CRIMINAL PENALTIES THEREUNDER.

101700238

TABLE 1607.1
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o, AND MINIMUM CONCENTRATED LIVE LOADS

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
1. Apartments (see residential)	—	—	—
2. Access floor systems			
Office use	50	2,000	—
Computer use	100	2,000	
3. Armories and drill rooms	150[b]	—	—
4. Assembly areas			
Fixed seats (fastened to floor)	60[a]		
Follow spot, projections and control rooms	50		
Lobbies	100[a]		
Movable seats	100[a]		
Stage floors	150[b]	—	—
Platforms (assembly)	100[a]		
Reviewing stands, grandstands and bleachers	100[a]		
	See Section 1607.21		
Stadiums and arenas with fixed seats (fastened to the floor)	60[a]		
	See Section 1607.21		
Other assembly areas	100[a]		
5. Balconies and decks	1.5 times the live load for the area served. Not required to exceed 100 psf.	—	—
6. Catwalks for maintenance and service access	40	300	—
7. Cornices	60	—	—
8. Corridors			
First floor	100	—	—
Other floors	Same as occupancy served except as indicated		
9. Dining rooms and restaurants	100[a]	—	—
10. Dwellings (see residential)	—	—	—
11. Elevator machine room and controlroom grating (on area of 2 inches by 2 inches)	—	300	—
12. Finish light floor plate construction (on area of 1 inch by 1 inch)	—	200	—
13. Fire escapes	100	—	—
On single-family dwellings only	40		
14. Fixed ladders	See Section 1607.16		—
15. Garages			—
Passenger vehicles only	40[c]	See Section 1607.7	
Trucks and buses	See Section 1607.8		—
16. Handrails, guards and grab bars	See Section 1607.9		—
17. Helipads	See Section 1607.6		—
18. Hospitals			
Corridors above first floor	80	1,000	—
Operating rooms, laboratories	60	1,000	
Patient rooms	40	1,000	
19. Hotels (see residential)	—	—	
20. Libraries			
Corridors above first floor	80	1,000	
Reading rooms	60	1,000	
Stack rooms	150[b]	1,000	See Section 1607.17

(continued)

INTERNATIONAL CODE COUNCIL®
Copyright © 2023 ICC. ALL RIGHTS RESERVED. Access by Alex Choury (alex@artisticdevelopment.com), (-) Order Number #101700238 on Jan 11, 2024 12:30 PM (CST) pursuant to License Agreement with ICC. No further reproduction, no further reproductions by any third party, or distribution authorized. Single user only, copying and networking prohibited. ANY UNAUTHORIZED REPRODUCTION OR DISTRIBUTION IS A VIOLATION OF THE FEDERAL COPYRIGHT ACT AND THE LICENSE AGREEMENT, AND SUBJECT TO CIVIL AND CRIMINAL PENALTIES THEREUNDER.

101700238

TABLE 1607.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o, AND MINIMUM CONCENTRATED LIVE LOADS

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
21. Manufacturing			
Heavy	250[b]	3,000	—
Light	125[b]	2,000	
22. Marquees, except one- and two-family dwellings	75	—	—
23. Office buildings			
Corridors above first floor	80	2,000	
File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—	—
Lobbies and first-floor corridors	100	2,000	
Offices	50	2,000	
24. Penal institutions			
Cell blocks	40	—	—
Corridors	100		
25. Recreational uses:			
Bowling alleys, poolrooms and similar uses	75[a]		
Dance halls and ballrooms	100[a]	—	—
Gymnasiums	100[a]		
Ice skating rink	250[b]		
Roller skating rink	100[a]		
26. Residential			
One- and two-family dwellings			
Uninhabitable attics without storage	10		
Uninhabitable attics with storage	20		
Habitable attics and sleeping areas	30	—	See Section 1607.20
Canopies, including marquees	20		
All other areas	40		
Hotels and multifamily dwellings			
Private rooms and corridors serving them	40		
Public rooms[m] and corridors serving them	100		
27. Roofs			
Ordinary flat, pitched, and curved roofs (that are not occupiable)	20		
Roof areas used for assembly purposes	100[a]		
Roof areas used for occupancies other than assembly	Same as occupancy served		
Vegetative and landscaped roofs:			
Roof areas not intended for occupancy	20		
Roof areas used for assembly purposes	100[a]		
Roof areas used for other occupancies	Same as occupancy served		
Awnings and canopies:			See Section 1607.13.2
Fabric construction supported by a skeleton structure	5[a]		
All other construction, except one-and two-family dwellings	20		
Primary roof members exposed to a work floor			
Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages		2,000	
All other primary roof members		300	
All roof surfaces subject to maintenance workers		300	

(continued)

INTERNATIONAL CODE COUNCIL®
Copyright © 2023 ICC. ALL RIGHTS RESERVED. Access by Alex Choury (alex@artisticdevelopment.com), (-) Order Number #101700238 on Jan 11, 2024 12:30 PM (CST) pursuant to License Agreement with ICC. No further reproduction, no further reproductions by any third party, or distribution authorized. Single user only, copying and networking prohibited. ANY UNAUTHORIZED REPRODUCTION OR DISTRIBUTION IS A VIOLATION OF THE FEDERAL COPYRIGHT ACT AND THE LICENSE AGREEMENT, AND SUBJECT TO CIVIL AND CRIMINAL PENALTIES THEREUNDER.

101700238
B.O.R.A. Appeal of Town of Davie Building Official William Diaz
Actions / Determinations related to Town of Davie Permit # 2024-6024 – Exhibit 'C'.

Any system or method of construction to be used shall be based on a rational analysis in accordance with well-established principles of mechanics. Such analysis shall result in a system that provides a complete load path capable of transferring loads from their point of origin to the load-resisting elements.

The total lateral force shall be distributed to the various vertical elements of the lateral force-resisting system in proportion to their rigidities, considering the rigidity of the horizontal bracing system or diaphragm. Rigid elements assumed not to be a part of the lateral force-resisting system are permitted to be incorporated into buildings provided their effect on the action of the system is considered and provided for in the design. A diaphragm is rigid for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is less than or equal to two times the average story drift. Where required by ASCE 7, provisions shall be made for the increased forces induced on resisting elements of the structural system resulting from torsion due to eccentricity between the center of application of the lateral forces and the center of rigidity of the lateral force-resisting system.

TABLE 1604.3
DEFLECTION LIMITS[a, b, c, h, i]

CONSTRUCTION	*L*	*S* or *W*[f]	*D* + *L*[d, g]
Roof members:[e]			
Supporting plaster or stucco ceiling	*l*/360	*l*/360	*l*/240
Supporting nonplaster ceiling	*l*/240	*l*/240	*l*/180
Not supporting ceiling	*l*/180	*l*/180	*l*/120
Members supporting screen surface[j]			*l*/60
Floor members	*l*/360	—	*l*/240
Exterior walls:			
With plaster or stucco finishes	—	*l*/360	—
With other brittle finishes	—	*l*/240	—
With flexible finishes	—	*l*/120	—
Interior partitions:[b]			
With plaster or stucco finishes	*l*/360	—	—
With other brittle finishes	*l*/240	—	—
With flexible finishes	*l*/120	—	—
Farm buildings	—	—	*l*/180
Greenhouses	—	—	*l*/120

For SI: 1 foot = 304.8 mm.

a. For structural roofing and siding made of formed metal sheets, the total load deflection shall not exceed *l*/60. For secondary roof structural members supporting formed metal roofing, the live load deflection shall not exceed *l*/150. For secondary wall members supporting formed metal siding, the design wind load deflection shall not exceed *l*/90. For roofs, this exception only applies when the metal sheets have no roof covering.

b. Flexible, folding and portable partitions are not governed by the provisions of this section. The deflection criterion for interior partitions is based on the horizontal load defined in Section 1607.15.

c. See Section 2403 for glass supports.

d. The deflection limit for the *D*+*L* load combination only applies to the deflection due to the creep component of long-term dead load deflection plus the short-term live load deflection. For lumber, structural glued laminated timber, prefabricated wood I-joists and structural composite lumber members that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection shall be permitted to be estimated as the immediate dead load deflection resulting from 0.5*D*. For lumber and glued laminated timber members installed or used at all other moisture conditions or cross-laminated timber and wood structural panels that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection is permitted to be estimated as the immediate dead load deflection resulting from *D*. The value of 0.5*D* shall not be used in combination with ANSI/AWC NDS provisions for long-term loading.

e. The above deflections do not ensure against ponding. Roofs that do not have sufficient slope or camber to ensure adequate drainage shall be investigated for ponding. See Section 1611 for rain and ponding requirements and Section 1503.4 for roof drainage requirements.

f. The wind load is permitted to be taken as 0.42 times the "component and cladding" loads for the purpose of determining deflection limits herein. Where members support glass in accordance with Section 2403 using the deflection limit therein, the wind load shall be no less than 0.6 times the "component and cladding" loads for the purpose of determining deflection.

g. For steel structural members, the dead load shall be taken as zero.

h. For aluminum structural members or aluminum panels used in skylights and sloped glazing framing, roofs or walls of sunroom additions or patio covers not supporting edge of glass or aluminum sandwich panels, the total load deflection shall not exceed *l*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *l*/175 for each glass lite or *l*/60 for the entire length of the member, whichever is more stringent. For aluminum sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed *1*/120.

i. For cantilever members, *l* shall be taken as twice the length of the cantilever.

j. Screen surfaces shall be permitted to include a maximum of 25-percent solid flexible finishes.

INTERNATIONAL CODE COUNCIL®
110
Copyright © 2023 ICC. ALL RIGHTS RESERVED. Access by Alex Choury (alex@artisticdevelopment.com), (-) Order Number #101700238 on Jan 11, 2024 12:30 PM (CST) pursuant to License Agreement with ICC. No further reproduction, no further reproductions by any third party, or distribution authorized. Single user only, copying and networking prohibited. ANY UNAUTHORIZED REPRODUCTION OR DISTRIBUTION IS A VIOLATION OF THE FEDERAL COPYRIGHT ACT AND THE LICENSE AGREEMENT, AND SUBJECT TO CIVIL AND CRIMINAL PENALTIES THEREUNDER.

B.O.R.A. Appeal of Town of Davie Building Official William Diaz
Actions / Determinations related to Town of Davie Permit # 2024-6024 – Exhibit 'D'.
101700238

SECTION 2310 through 2313
RESERVED

SECTION 2314
HIGH-VELOCITY HURRICANE ZONES

2314.1 Design. Wood members and their fastenings shall be designed to comply with ASCE 7 by methods based on rational analysis or approved laboratory testing procedures, both performed in accordance with fundamental principles of theoretical and applied mechanics.

2314.2 Workmanship. Wood members shall be framed, anchored, tied and braced to develop the strength and rigidity necessary for the purposes for which they are used and to resist the loads imposed as set forth in this code. Wood construction shall be in conformance with the tolerances, quality and methods of construction as prescribed by the standards in Chapter 35 of this code.

2314.3 Fabrication.

2314.3.1 Preparation, fabrication and installation of wood members and the glues, connectors and mechanical devices for fastening shall conform to good engineering practice.

2314.3.2 Any person desiring to manufacture or fabricate wood truss assemblies shall obtain a certificate of competency from the authority having jurisdiction.

2314.4 The following standards, as set forth in Chapter 35 of this code, are hereby adopted for the design and quality of wood members and their fastenings:

2314.4.1 American Hardboard Products Association, 887-B Wilmette Road, Palatine, IL 60067 AHA.

1. Basic Hardboard ANSI/AHA A135.4–1982.
2. Prefinished Hardboard Paneling ANSI/AHA A135.5–1982.
3. Hardboard Siding ANSI/AHA A135.6–1990.
4. Cellulosic Fiberboard ANSI/AHA A194.1–1985.
5. Recommended Product and Application Specification—Structural Insulating Roof Deck, I.B. Spec. No. 1.
6. Recommended Product and Application Specification—$^{1}/_{2}$-inch Fiberboard Nail-Base-Sheathing I.B. Spec. No. 2.
7. Recommended Product and Application Specification—$^{1}/_{2}$-inch Intermediate Fiberboard Sheathing I.B. Spec. No. 3.

2314.4.2 American Institute of Timber Construction, 333 West Hampden Avenue, Englewood, CO 80110 AITC.

1. Typical Construction Details, AITC 104.
2. Code of Suggested Practices, AITC 106.
3. Standard for Heavy Timber Construction, AITC 108.
4. Standard for Preservative Treatment for Structural Glued Laminated Timber, AITC 109.
5. Standard Appearance Grades for Structural Glued Laminated Timber, AITC 110.
6. Standard for Tongue and Groove Heavy Timber Roof Decking, AITC 112.
7. Standard for Dimensions of Glued Laminated Structural Members, AITC 113.
8. Standard Specifications for Hardwood Glued Laminated Timber, AITC 119.
9. Technical Report No. 7, Calculation of Fire Resistance of Glued Laminated Timber.

2314.4.3 APA The Engineered Wood Association (formerly APA American Plywood Association), 7011 South 19th Street, Tacoma, WA 98466.

1. APA Design Construction Guide, E30.
2. Plywood Design Specification Y510J.
3. Plywood Design Specification—Design and Fabrication of Plywood Beams, Supplement No. 1 S811.
4. Plywood Design Specification—Design and Fabrication of Plywood Beams, Supplement No. 2 S812.
5. Plywood Design Specification-Design and Fabrication of Plywood Stressed—Skin Panels, Supplement No. 3 U813.
6. Plywood Design Specifications—Design and Fabrication of Plywood Sandwich Panels Supplement No. 4 U814.
7. Plywood Design Specifications—Design and Fabrication of All-Plywood Beams, Supplement No. 5 H815.
8. Plywood Folded Plate, Laboratory Report 21 V910.
9. APA Design/Construction Guide Diaphragms L350.
10. Performance Standards and Policies for Structural-Use Panels PRP-108.
11. 303 Siding Manufacturing Specifications B840.
12. Standard Specifications for Structural Glued Laminated Timber of Softwood Species, ANSI 117.
13. Structural Glued Laminated Timber, ANSI A190.1.

2314.4.4 ASTM International, 1916 Race Street, Philadelphia, PA 19103-1187 ASTM.

1. Standard Test Methods for Mechanical Fasteners in Wood, ASTM D1761.
2. Accelerated Weathering on Fire-Retardant Treated Wood for Fire Testing, ASTM D2898.
3. Surface Burning Characteristics of Building Materials, ASTM E84.
4. Hygroscopic Properties of Fire-Retardant Wood and Wood-Base Products, ASTM D3201.

INTERNATIONAL CODE COUNCIL®
Copyright © 2023 ICC. ALL RIGHTS RESERVED. Access by Ella Khoury (alex@artisticdevelopment.com), (-) Order Number #101700238 on Jan 11, 2024 12:30 PM (CST) pursuant to License Agreement with ICC. No further reproduction, no further reproductions by any third party, or distribution authorized. Single user only, copying and networking prohibited. ANY UNAUTHORIZED REPRODUCTION OR DISTRIBUTION IS A VIOLATION OF THE FEDERAL COPYRIGHT ACT AND THE LICENSE AGREEMENT, AND SUBJECT TO CIVIL AND CRIMINAL PENALTIES THEREUNDER.

101700238

5. Standard Specifications for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems, ASTM D3498.

2314.4.5 American Wood Preservers Association, P.O. Box 361784, Birmingham, AL 35236-1784.

1. AWPA Use Category Systems Standard U1.
2. AWPA Standard M4 Care of Pressure Treated Wood Products.

2314.4.6 National Institute for Standards and Technology Standard Development Services Section, Standards Application and Analysis Division, Washington, D.C. 20234 NIST.

1. Mat-Formed Particleboard CS236.
2. Structural Plywood PS1.
3. American Softwood Lumber Standard PS20.
4. Performance Standard for Wood Structural Panels PS2{*}.

{*} All wood structural panels except oriented strand boards used as floor sheathing in interior applications or plywood shall have product approval and shall be tested in accordance with High-Velocity Hurricane Zone Testing Protocols.

2314.4.7 American Wood Council, 222 Catoctin Circle SE, Suite 201, Leesburg, VA 20175.

1. ANSI/AWC NDS—2018: National Design Specification for Wood Construction with 2018 NDS Supplement.
2. AWC Wood Structural Design Data.
3. AWC ST JR—2015: Span Tables for Joists and Rafters.
4. AWC 2015 Design Values for Joists and Rafters.
5. AWC WCD No. 1—Wood Construction Data No. 1, Details for Conventional Wood Frame Construction.
6. AWC WCD No. 4—Wood Construction Data No. 4, Plank-and-Beam Framing for Residential Building.
7. AWC WCD No. 5—Wood Construction Data No. 5, Heavy Timber Construction.
8. AWC WCD No. 6—Wood Construction Data No. 6, Design of Wood Frame Structures for Permanence.
9. ANSI/AWC PWF–2015: Permanent Wood Foundation (PWF) Design Specification.
10. ANSI/AWC WFCM–2018: Wood Frame Construction Manual for One- and Two-Family Dwellings.
11. ANSI/AWC SDPWS-2015: Special Design Provisions for Wind and Seismic.

2314.4.8 Timber Company, Inc., 2402 Daniels Street, Madison, WI 53704.

TECO Performance Standards and Policies for Structural use Panels. PRP-133.

2314.4.9 Truss Plate Institute, 218 N. Lee Street, Suite 312, Alexandria, VA 22314.

1. National Design Standard for Metal Plate Connected Wood Truss Construction (excluding Chapter 2).
2. Building Component Safety Information (BCSI 1) Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses. [A joint publication with the Wood Truss Council of America (WTCA).]

2314.4.10 Reserved.

SECTION 2315
HIGH-VELOCITY HURRICANE ZONES—QUALITY

2315.1 Identification. Reserved.

2315.1.1 Reserved.

2315.1.2 Reserved.

2315.1.3 Wood shingles and/or shakes shall be identified by the grademark of an approved grading or inspection bureau or agency.

2315.1.4 Reserved.

2315.1.5 Reserved.

2315.1.6 Reserved.

2315.1.7 Reserved.

2315.1.8 Reserved.

2315.1.9 Reserved.

2315.1.10 Reserved.

2315.1.11 All wood-based structural panels, including those made of fiberboard, hardboard and particleboard shall have product approval. Product approval shall be given upon certification by an approved independent testing laboratory that the product:

1. Complies with the applicable standards set forth above.
2. Complies with the manufacturer's published design properties before and after a wet-dry, wet-dry cycle.
3. When tested dry, maintains a safety factor of 2:1 and when tested after the cycles specified in Section 2315.1.11(2) above maintains a safety factor of 1.5:1. Testing shall be as specified in the testing protocol.

2315.2 When wood structural panels are used as floor sheathing in interior applications, the panel sheathing shall be rated for Exposure 1 or Exterior in accordance with PS 1 or PS 2.

2315.3 All lumber 2 inches (51 mm) or less in thickness shall contain not more than 19-percent moisture at the time of permanent incorporation in a building or structure and/or at the time of treatment with a wood preservative.

INTERNATIONAL CODE COUNCIL®
Copyright © 2023 ICC. ALL RIGHTS RESERVED. Accessed by Alex Choury (alex@artisticdevelopment.com), (-) Order Number #101700238 on Jan 11, 2024 12:30 PM (CST) pursuant to License Agreement with ICC. No further reproduction, no further reproductions by any third party, or distribution authorized. Single user only, copying and networking prohibited. ANY UNAUTHORIZED REPRODUCTION OR DISTRIBUTION IS A VIOLATION OF THE FEDERAL COPYRIGHT ACT AND THE LICENSE AGREEMENT, AND SUBJECT TO CIVIL AND CRIMINAL PENALTIES THEREUNDER.

B.O.R.A. Appeal of Town of Davie Building Official William Diaz
Actions / Determinations related to Town of Davie Permit # 2024-6024 – Exhibit 'F'.

Table 4B Reference Design Values for Visually Graded Southern Pine Dimension Lumber (2" - 4" thick)[1,2,3,4,5]

(Tabulated design values are for normal load duration and dry service conditions, unless specified otherwise. See NDS 4.3 for a comprehensive description of design value adjustment factors.)

USE WITH TABLE 4B ADJUSTMENT FACTORS

Species and commercial grade	Size classification	Design values in pounds per square inch (psi)							Specific Gravity[6]	Grading Rules Agency
		Bending	Tension parallel to grain	Shear parallel to grain	Compression perpendicular to grain	Compression parallel to grain	Modulus of Elasticity			
		F_b	F_t	F_v	$F_{c\perp}$	F_c	E	E_{min}	G	
SOUTHERN PINE										
Dense Select Structural	2" - 4" wide	2,700	1,900	175	660	2,050	1,900,000	690,000	0.55	SPIB
Select Structural		2,350	1,650	175	565	1,900	1,800,000	660,000		
Non-Dense Select Structural		2,050	1,450	175	480	1,800	1,600,000	580,000		
No.1 Dense		1,650	1,100	175	660	1,750	1,800,000	660,000		
No.1		1,500	1,000	175	565	1,650	1,600,000	580,000		
No.1 Non-Dense		1,300	875	175	480	1,550	1,400,000	510,000		
No.2 Dense		1,200	750	175	660	1,500	1,600,000	580,000		
No.2		1,100	675	175	565	1,450	1,400,000	510,000		
No.2 Non-Dense		1,050	600	175	480	1,450	1,300,000	470,000		
No.3 and Stud		650	400	175	565	850	1,300,000	470,000		
Construction	4" wide	875	500	175	565	1,600	1,400,000	510,000	0.55	
Standard		475	275	175	565	1,300	1,200,000	440,000		
Utility		225	125	175	565	850	1,200,000	440,000		
Dense Select Structural	5" - 6" wide	2,400	1,650	175	660	1,900	1,900,000	690,000	0.55	
Select Structural		2,100	1,450	175	565	1,800	1,800,000	660,000		
Non-Dense Select Structural		1,850	1,300	175	480	1,700	1,600,000	580,000		
No.1 Dense		1,500	1,000	175	660	1,650	1,800,000	660,000		
No.1		1,350	875	175	565	1,550	1,600,000	580,000		
No.1 Non-Dense		1,200	775	175	480	1,450	1,400,000	510,000		
No.2 Dense		1,050	650	175	660	1,450	1,600,000	580,000		
No.2		1,000	600	175	565	1,400	1,400,000	510,000		
No.2 Non-Dense		950	525	175	480	1,350	1,300,000	470,000		
No.3 and Stud		575	350	175	565	800	1,300,000	470,000		
Dense Select Structural	8" wide	2,200	1,550	175	660	1,850	1,900,000	690,000	0.55	
Select Structural		1,950	1,350	175	565	1,700	1,800,000	660,000		
Non-Dense Select Structural		1,700	1,200	175	480	1,650	1,600,000	580,000		
No.1 Dense		1,350	900	175	660	1,600	1,800,000	660,000		
No.1		1,250	800	175	565	1,500	1,600,000	580,000		
No.1 Non-Dense		1,100	700	175	480	1,400	1,400,000	510,000		
No.2 Dense		975	600	175	660	1,400	1,600,000	580,000		
No.2		925	550	175	565	1,350	1,400,000	510,000		
No.2 Non-Dense		875	500	175	480	1,300	1,300,000	470,000		
No.3 and Stud		525	325	175	565	775	1,300,000	470,000		
Dense Select Structural	10" wide	1,950	1,300	175	660	1,800	1,900,000	690,000	0.55	
Select Structural		1,700	1,150	175	565	1,650	1,800,000	660,000		
Non-Dense Select Structural		1,500	1,050	175	480	1,600	1,600,000	580,000		
No.1 Dense		1,200	800	175	660	1,550	1,800,000	660,000		
No.1		1,050	700	175	565	1,450	1,600,000	580,000		
No.1 Non-Dense		950	625	175	480	1,400	1,400,000	510,000		
No.2 Dense		850	525	175	660	1,350	1,600,000	580,000		
No.2		800	475	175	565	1,300	1,400,000	510,000		
No.2 Non-Dense		750	425	175	480	1,250	1,300,000	470,000		
No.3 and Stud		475	275	175	565	750	1,300,000	470,000		
Dense Select Structural	12" wide	1,800	1,250	175	660	1,750	1,900,000	690,000	0.55	
Select Structural		1,600	1,100	175	565	1,650	1,800,000	660,000		
Non-Dense Select Structural		1,400	975	175	480	1,550	1,600,000	580,000		
No.1 Dense		1,100	750	175	660	1,500	1,800,000	660,000		
No.1		1,000	650	175	565	1,400	1,600,000	580,000		
No.1 Non-Dense		900	575	175	480	1,350	1,400,000	510,000		
No.2 Dense		800	500	175	660	1,300	1,600,000	580,000		
No.2		750	450	175	565	1,250	1,400,000	510,000		
No.2 Non-Dense		700	400	175	480	1,250	1,300,000	470,000		
No.3 and Stud		450	250	175	565	725	1,300,000	470,000		

Copyright © American Wood Council. Downloaded/printed pursuant to License Agreement. No reproduction or transfer authorized.

2308.10.10 Attic ventilation. For attic ventilation, see Section 1202.2.

2308.11 Reserved.

2308.11.1 Reserved.

2308.11.2 Reserved.

2308.11.3 Reserved.

2308.11.3.1 Reserved.

2308.12 Reserved.

2308.12.1 Reserved.

2308.12.2 Reserved.

2308.12.3 Reserved.

2308.12.4 Reserved.

2308.12.5 Reserved.

2308.12.6 Reserved.

2308.12.7 Reserved.

2308.12.8 Reserved.

2308.12.9 Reserved.

SECTIONS 2309 - 2313 RESERVED

SECTION 2314 HIGH-VELOCITY HURRICANE ZONES — GENERAL

2314.1 Design. Wood members and their fastenings shall be designed to comply with this code by methods based on rational analysis or approved laboratory testing procedures, both performed in accordance with fundamental principles of theoretical and applied mechanics.

2314.2 Workmanship. Wood members shall be framed, anchored, tied and braced to develop the strength and rigidity necessary for the purposes for which they are used and to resist the loads imposed as set forth in this code. Wood construction shall be in conformance with the tolerances, quality and methods of construction as prescribed by the standards in Chapter 35 of this code.

Following Hurricane Andrew many complaints were voiced after seeing the aftermath. One of the primary issues is the ability of a building official to enforce the workmanship section without employing personal experiences and judgment. For that reason the workmanship standards were not expanded to include more requirements than are already stated in the adopted industry standards personal experiences. However the decision of acceptable workmanship is very much in the preview of the building official and work can be disapproved if, in the judgment of such building official it does not meet industry standards. The normal appeal against the judgment of the building official would be the Board of Rules and Appeals.

2314.3 Fabrication.

2314.3.1 Preparation, fabrication and installation of wood members and the glues, connectors and mechanical devices for fastening shall conform to good engineering practice.

The nature of wood construction is such that the transfer of forces from one member to another is entirely dependant on the individual connections, joints, and fasteners. The wood systems usually consist of series of links wherein the failure of any single one could create a progressive or ultimate system failure. The intent of the code is to emphasize good workmanship and engineering assessment.

2314.3.2 Any person desiring to manufacture or fabricate wood truss assemblies shall obtain a certificate of competency from the authority having jurisdiction.

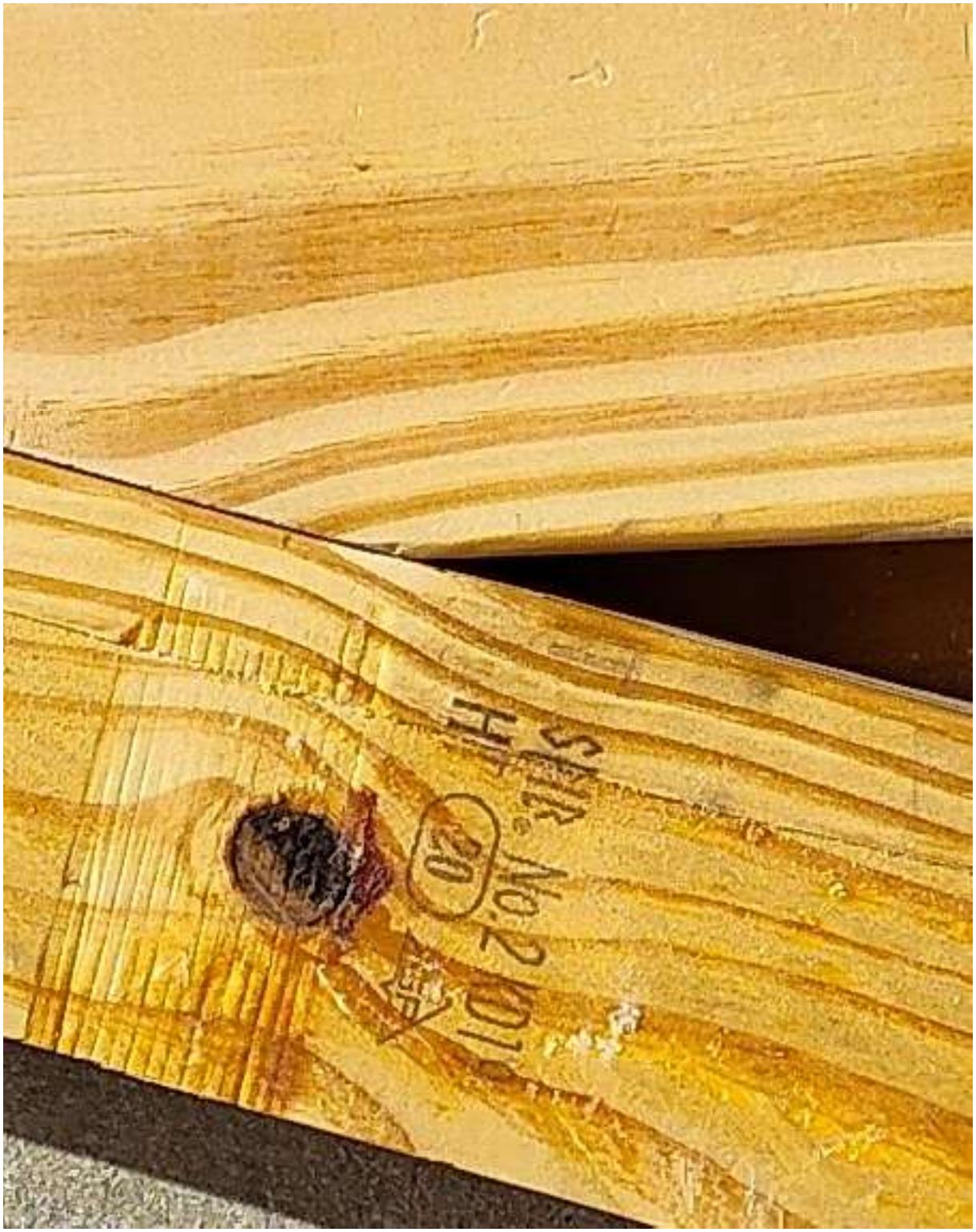
The manufacture of pre-engineered wood trusses requires a high level of competency in all aspects of engineering, quality control and consistency. Knowledge and understanding regarding the loads imposed on such trusses during fabrication, loading, shipping, and installation requires full understanding and competency of the entire process.

2314.4 The following Standards, as set forth in Chapter 35 of this code, are hereby adopted for the design and quality of wood members and their fastenings:

The use of the term "adopted" means that these standards become part of the code as if they were printed word for word in the code. Where a conflict may occur, the more restrictive provisions would apply.

2314.4.1 American Hardboard Products Association 887-B Wilmette Road, Palatine, IL 60067 AHA

1. Basic Hardboard ANSI/AHA A135.4-1982
2. Prefinished Hardboard Paneling ANSI/AHA A135.5-1982
3. Hardboard Siding ANSI/AHA A135.6-1990
4. Cellulosic Fiberboard ANSI/AHA A194.1-1985
5. Recommended Product and Application Specification - Structural Insulating Roof Deck, I.B. Spec. No. 1
6. Recommended Product and Application Specification - ½ inch Fiberboard Nail-Base-Sheathing I.B. Spec. No. 2
7. Recommended Product and Application Specification - ½


SAW
No.2
20


JOHNSON LEVEL & TOOL MFG. CO.

Referenced Code Sections Verbatim

104.1.2 Powers and Duties of the Building Official. The Building Official shall be vested with the powers and subject to regulations, as provided by Florida Statute, Chapter 468 and BORA, as set forth in Section 113 of this Code. The Building Official is hereby authorized and directed to enforce the provisions of this Code. The Building Official shall delegate powers, duties, and assignments to BORA-certified Chief Inspectors to render interpretations of this Code and to adopt policies and procedures in order to clarify the application of the technical provisions of this Code in categories in which the Building Official is not certified. Such interpretations, policies, and procedures shall be in compliance with the intent and purpose of this Code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this Code.

107.3.4.0.6 For any work involving structural design, the Building Official may require that plans, calculations, and specifications be prepared by a Professional Engineer, regardless of the cost of such work.

107.3.5.2 Computations, stress diagrams, shop drawings, results of site tests, floor plans of existing buildings to which additions are proposed, and other data necessary to show compliance with this Code, the correctness of the plans, and the sufficiency of structural and mechanical design shall be included when required by the Building Official.

107.3.5.2.1 When applying for a permit, calculations prepared by the designer of record for Group R3 or R2 (townhouse only) shall be submitted for the complete building for the structural requirements of this Code.

Exception: Component systems covered by product approval or designed by a delegated professional.

110.1 General. Construction or work for which a permit is required shall be subject to inspection by the Building Official, and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval of an inspection shall not be construed to be an approval of a violation of the provisions of this Code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this Code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the Building Official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

489.113(3)(b) A general, building, or residential contractor shall not be required to subcontract the installation, or repair made under warranty, of wood shingles, wood shakes, or asphalt or fiberglass shingle roofing materials on a new building of his or her own construction.

105.1 Required. Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, remove, demolish, or to change the occupancy of any building or structure or to erect, install, enlarge, alter, repair, remove, convert, or replace any impact-resistant coverings, electrical, gas, mechanical or plumbing system, the installation of which is regulated by this Code, or to cause any such work to be done; shall first make application to the Building Official or Fire Code Official as indicated in the FFPC or a duly authorized representative and obtain the required permits.

1512.3 Permits outside these high-velocity hurricane zone requirements shall comply with Section 105. Permits within the HVHZ shall be required for all work in connection with the application, repair or maintenance of any roofing component or any roofing assembly and/or any of its components except as otherwise permitted in Section 105 of this code.

1512.3.1 All new roofing construction, including recovering and reroofing, repair or maintenance shall have an HVHZ Uniform Roofing Permit Application, as required by the authority having jurisdiction, completed and executed by a licensed contractor.

1512.3.2 The HVHZ Uniform Roofing Permit Application shall include calculations in accordance with Chapter 16 (High-Velocity Hurricane Zones) of this code, unless the roofing assembly is less than the height/pressure threshold allowed in the applicable protocols herein.

2319.10 Roof framing. The permit documents shall include roof framing plans showing spacing and spans of all roof members indicating any fabricated elements to be designed and furnished by others and shall include the details for support and bearing of the roof structural system, for the permanent cross/lateral/diagonal bracing and anchorage required to resist dead, live and wind loads as set forth in Chapter 16 (High-Velocity Hurricane Zones). The framing plans shall also indicate the uplift forces applied on the roof, sheathing type, thickness and nailing requirements for the sheathing. The roof framing plans shall be prepared by, and bear the sign and seal of, a registered professional engineer or registered architect of record proficient in structural design.

2319.17 Wood trusses.

2319.17.1 Trussed rafters.

Trussed rafters shall be designed by methods admitting of rational analysis by a registered professional engineer or registered architect proficient in structural design based on the standards set forth in Section 2314.4.

Certificate of Competency

Manufacturer or Fabricator
of Construction Materials,
Products or Assemblies

MIAMI-DADE COUNTY APPROVED

Miami-Dade County, Florida
Department of Regulatory and
Economic Resources
11805 S.W. 26 Street, Room 208
Miami, Florida 33175-2474
Tel (786) 315-2590 Fax (786) 315-2599

Certification No. 23-0719.03

The Department of Regulatory and Economic Resources hereby certifies that ***Capital Trusses, LLC*** located at ***4268 Seaboard Rd., Orlando, FL 32808*** complies with the requirements of Article IV, Chapter 8 of the Code of Miami-Dade County as a manufacturer and/or fabricator of **Wood Trusses.**

Certification Date: ***10/1/2023***
Certification Expires: ***9/30/2024***

Americo Segura, M.S., C.G.C.
Quality Assurance Unit Supervisor
Product Control Section

THIS CERTIFICATE DOES NOT ENTITLE HOLDER TO CONTRACT FOR ERECTION OR INSTALATION. WHERE SEVERAL PLANTS ARE OWNED BY THE SAME COMPANY A SEPARATE CERTIFICATE OF COMPLIANCE SHALL BE REQUIRED FOR EACH PLANT. THIS CERTIFICATE SHALL BE REVOKED IF THE HOLDER FAILS TO MEET THE CODE OF POLICY REQUIREMENTS COVERING THIS PRODUCT.

MIAMI-DADE COUNTY, FLORIDA
DEPARTMENT OF REGULATORY AND ECONOMIC RESOURCES
PRODUCT CONTROL SECTION
ProductApproval@miamidade.gov

MINIMUM REQUIREMENTS FOR OBTAINING A CERTIFICATE OF COMPETENCY FOR PREFABRICATING METAL PLATE CONNECTED WOOD TRUSSES CHECKLIST #0340

- ❑ (1) Completed ***Product Control Application for Certificate of Competency*** along with a check payable to *"Department of Regulatory and Economic Resources"* for the applicable amount. The application fee covers a one-year program participation period.

- ❑ (2) Letter from the metal plate connector manufacturing company, or copy of the contract, stating that they will supply approved metal plate connectors as per FBC 2319.17.2.2.

- ❑ (3) Letter or a copy of the contract from a lumber inspection bureau or an authorized agency stating that the agency will conduct monthly inspections of lumber used in fabrication, per FBC 2319.17.2.3.4 *Fabrication*. Following each inspection, a report must be submitted to this office by the inspection agency.

- ❑ (4) Letter or a copy of the contract from a lumber inspection bureau or an authorized agency, or an authorized Florida Registered professional engineer, or an authorized independent testing laboratory under the supervision of a professional engineer registered in the State of Florida, stating that they will conduct monthly fabrication compliance inspections per FBC 2319.17.2.3.5 *Fabrication*. Following each inspection, a report must be submitted to this office by the inspection agency.

- ❑ (5) Truss design engineering drawings must be kept as part of your records for not less than five (5) years. This requirement shall be addressed procedurally in the organization's quality assurance program or otherwise provide a statement on company letterhead, signed by an official of the company, that this requirement will be met.

- ❑ (6) Trusses must be fabricated in strict compliance with FBC 2319.17.2.2 *Materials and Specifications*. Each truss shall identify the fabricator's stamp on a web member and 75% of the stamps shall be placed so as to be clearly visible after erection and before placement of ceiling in compliance with FBC 2319.17.2.3.2. This requirement shall be addressed procedurally in the organization's quality assurance program or otherwise provide a statement on company letterhead, signed by an official of the company, that this requirement will be met.

- ❑ (7) The fabricator shall provide means to ensure that trusses handled during fabrication, delivery, and at the job site are not subjected to excessive lateral bending. This requirement shall be addressed procedurally in the organization's quality assurance program or otherwise provide a statement on company letterhead, signed by an official of the company, that this requirement will be met.

- ❑ (8) Submit, if applicable, any additional documents issued by other third-party certification entities such as FDOT, AISC, SJI, PCI, or an ISO 9001 certificate relevant to the scope of fabrication.

- ❑ (9) An initial inspection will be performed at the fabricator's facility prior to the issuance of the Certificate unless otherwise approved by our Office.

LTS/MTS/HTS

Twist Straps

Twist straps provide a tension connection between two wood members. They resist uplift at the heel of a truss economically. LTS/MTS have a 2"-bend section and HTS has a 3¾"-bend section that eliminates interference at the transition points between the two members.

Material: LTS — 18 gauge; MTS — 16 gauge; HTS — 14 gauge

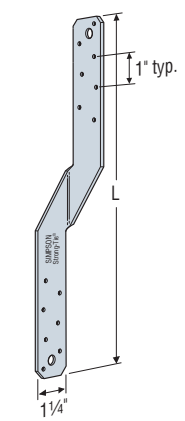
Finish: Galvanized. Some products available in stainless steel or ZMAX® coating.

Installation:

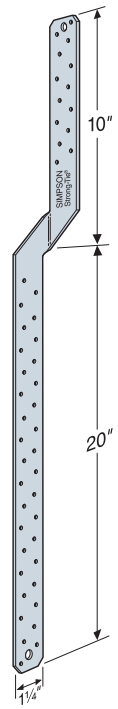
- Use all specified fasteners, with half into each member being connected, to achieve the listed loads; see General Notes.
- LTS, MTS and HTS are available with the bend reversed. Specify "-REV" after the model number, such as MTS16-REV.

Codes: See p. 13 for Code Reference Key Chart

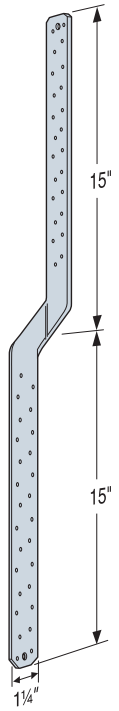
Web Applications: Visit **app.strongtie.com/rws** to access our Roof-to-Wall Selector web application.



LTS12
(MTS and HTS similar)



MTS30
(HTS30 similar)



HTS30C
(MTS30C similar)

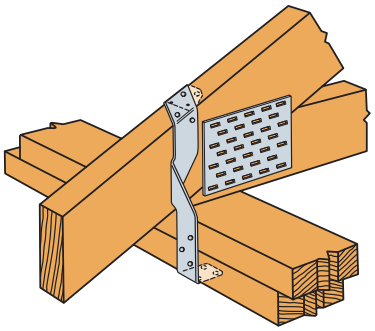
These products are available with additional corrosion protection. For more information, see p. 16.

SS For stainless-steel fasteners, see p. 23.

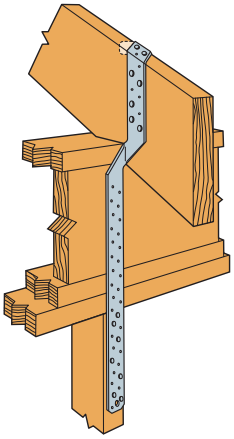
SD Many of these products are approved for installation with Strong-Drive® SD Connector screws. See pp. 362–366 for more information.

	Model No.	Strap Length (in.)	Total Quantity of Fasteners		DF/SP Allowable Uplift Loads (160)		SPF/HF Allowable Uplift Loads (160)		Code Ref.
			0.148" x 3" Nails	0.148" x 1½" Nails	0.148" x 3" Nails	0.148" x 1½" Nails	0.148" x 3" Nails	0.148" x 1½" Nails	
SS	LTS12	12	12	12	660	645	570	515	IBC®, FL, LA
	LTS16	16							
	LTS20	20							
SS	MTS12	12	14	14	990	990	850	850	
	MTS16	16							
SS	MTS20	20							
	MTS24C	24							
	MTS30	30							
	MTS30C	30							
	HTS16	16	16	16	1,415	1,415	1,215	1,215	
	HTS20	20							
	HTS24	24							
	HTS30	30							
	HTS30C	30							

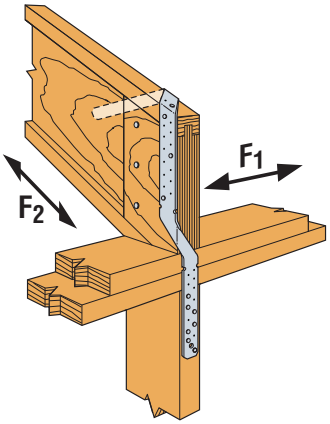
1. See pp. 276–277 for Straps and Ties General Notes.
2. All LTS, MTS and HTS models (except for MTS12 and HTS16) have additional nail holes.
3. All straps except the MTS30 and HTS30 have the twist in the center of the strap.
4. Twist straps do not need to be wrapped over the truss to achieve the allowable load.
5. May be installed on the inside face of the stud.
6. Allowable lateral loads are F_1 = 75 lb. and F_2 = 125 lb. when the following installation requirements are met. The first seven nail holes on each side of the bend must be filled with 0.148" x 1½" minimum nails. All additional fasteners may be installed in any remaining strap holes.
7. For simultaneous loads in more than one direction, the connector must be evaluated using either the Unity Equation or the 75% Rule, as described in Straps and Ties General Notes on p. 277.
8. **Fasteners:** Nail dimensions are listed diameter by length. See pp. 23–24 for fastener information.
9. Using Strong-Drive® SD Connector (SD9112) screws for 0.148" x 1½" and 0.148" x 3" nails will get the same loads as using nails.



MTS Installation as a Truss-to-Top Plate Tie



Typical MTS30 Installation



MTS30 Installation with I-Joist Rafter

C-C-2024 ©2024 SIMPSON STRONG-TIE COMPANY INC.

Item 2

Broward County Board of Rules and Appeals

1 N. University Drive Suite 3500B, Plantation, FL 33324

broward.org/CodeAppeals | 954-765-4500 | rulesboard@broward.org

TO: Members of the Broward County Board of Rules and Appeals

FROM: Administrative Director

DATE: September 11, 2025

RE: Fiscal Year 2026 Budget (October 1, 2025 – September 30, 2026)

Recommendation

The Administrative Director recommends that the Board of Rules and Appeals authorize, by motion, an operating budget of $4,444,600 for the fiscal year (FY) 2026. The operating budget allocates funding for personnel services, operational expenses, capital outlay, and office relocation. Comparing the FY 2025 adopted budget of $3,122,880 with the FY 2026 requested budget of $4,444,600, there is an increase of $1,321,720 or 42.3%.

Reasons

The recommended budget includes adequate funding for operating expenses and includes substantial reserves. As of August 2025, the Board of Rules and Appeals has a fund balance (reserves) of $13,651,243. We anticipate an increase of approximately $907,518 this year, making our fund balance $14,558,761 or 6.23% by September 30, 2025. In addition, we expect to earn $400,000 in interest earnings and less 5% ($180,000) for the fiscal year 2025, which would increase the fund balance to $14,778,761.

Expenses Overview:

Personnel Services, including salaries and employee benefits, are $2,352,230 in FY 2026 compared to $2,260,640 in the FY 2025 adopted budget. The total increase in FY 2026 is $91,590, or approximately 4%. The increase reflects salary increase (cost of living and annual performance pay) and associated fringe benefits of FICA, Medicare, and FRS.

Operating Expenses in FY 2026 are $1,967,570 compared to $747,240 in the FY 2025 adopted budget. This is an increase of $1,220,330, or 163%, in anticipation of the move to a new office space and furniture, as well as recurring operating expenses for travel and subscriptions.

The requested **Capital Outlay** expense in FY 2026 is $124,800 compared to $115,000 in FY 2025, a decrease of $9,800, or -9%. The decrease is due to the one-time nature of the expenditure for the paperless transition project.

Revenue Overview:

Revenues remain sufficient to cover the expenses associated with each fiscal year. There is no anticipated rate increase in the next fiscal year. The rate recommendation decision is due to our financial reserves and will be evaluated by the Board each year.

The FY 2026 projected revenues increase by 5.26% compared to FY 2025, based on the economic development projects in multiple municipalities. From a macroeconomic perspective, the economy shows strength, resilient GDP growth, stable inflation, and indicators point towards a durable economy.

A recent history of municipal fees received and projected is listed below:

Revenue	FY 2023 Actual	FY 2024 Actual	FY 2025 Budget	FY 2026 Projected
Permit Fees	$3,548,478	$3,289,903	$3,200,000	$3,200,000
Interest & Other Earnings	$260,383	$411,457	$400,000	$430,000
Fund Balance (Reserves)	$11,447,666	$12,743,725	$13,651,243	$14,333,000

Forms and the Budgeting Process
Attached are a budget summary and performance measures reported to the Broward County Budget Office as part of the County's annual budget development process.

Respectfully Submitted,

Dr. Ana C. Barbosa

Division

Board of Rules and Appeals

SECTION SUMMARY

	FY24 Actuals	FY25 Budget	FY26 Budget
Board of Rules and Appeals	$2,792,706	$16,846,000	$17,781,500
Total	**$2,792,706**	**$16,846,000**	**$17,781,500**

REVENUES

	FY24 Actuals	FY25 Budget	FY26 Budget
Permits Fees Special Assessment	$3,289,903	$3,200,000	$3,200,000
Charges for Services	($1,140)	$0	$0
Interest and Other Earnings	$411,457	$400,000	$430,000
Fund Balance	$12,743,725	$13,426,000	$14,333,000
Less Five Percent	$0	($180,000)	($181,500)
Total	**$16,443,945**	**$16,846,000**	**$17,781,500**

APPROPRIATIONS

	FY24 Actuals	FY25 Budget	FY26 Budget
Personnel Services	$2,090,264	$2,260,640	$2,412,600
Operating Expenses	$548,281	$747,240	$1,950,860
Capital Outlay	$154,161	$115,000	$141,800
Other Budgetary Reserves	$0	$13,723,120	$13,276,240
Total	**$2,792,706**	**$16,846,000**	**$17,781,500**
Total Positions	**13**	**13**	**13**

BUDGET VARIANCES

(115,000)	Decrease in capital outlay due to the one-time nature of the expenditures.
(446,880)	Decrease in reserves primarily due to an increase in one-time operating expenses.
$32,970	Normal Increases and Decreases
	51,340 Personnel Services
	(18,370) Operating Expenses
	BUDGET SUPPLEMENTS
100,620	Increase in recurring personnel services to reflect the Board of Rules and Appeals proposed salary increase of 5%.
44,900	Increase in recurring operating expenses for annual software maintenance.
1,177,090	Increase in operating expenses for the rental and build-out of a new office space.
141,800	Increase in one-time capital expenses for the purchase of two vehicles, computer hardware and software, and books.
$935,500	TOTAL INCREASE

Section

Board of Rules and Appeals

GOAL STATEMENT

To establish and enforce Florida Building Code regulations on a uniform basis to protect the health, safety and welfare of persons and property in Broward County.

PERFORMANCE MEASURES

	FY24 Actual	FY25 Budget	FY26 Projected
Number of appeals filed	0	4	4
Number of code changes approved by the Broward County Board of Rules and Appeals	241	14	15
Number of code interpretations approved by the Broward County Board of Rules and Appeals and staff	1,038	4,520	4,000
Number of training seminars and training sessions presented	58	100	60
Number of certifications	408	550	600
Number of technical advisory committee and subcommittee/workgroup sessions of the Florida Building Commission attended as a voting member	43	16	15
Number of call outs for building code compliance review requested by either building officials or chiefs for Broward County Board of Rules and Appeals code compliance staff	296	750	250
Number of training sessions attended by Board of Rules and Appeals staff	204	300	300
Number of complaints received leading to investigations	0	5	1

PROGRAM DESCRIPTION:

The responsibilities of the agency include reviewing inspections and plan reviews conducted by jurisdictional employees for compliance with both the County and State Building and Fire Codes as well as conducting random, requested, and investigative inspections to provide uniformity to the interpretation of the codes throughout Broward County. The agency conducts educational seminars to aid in the uniform enforcement of the building codes, fire codes, national electrical code, floodplain codes and many other referenced standards. Staff makes recommendations to the Board of Rules and Appeals on interpretations, appeals and also on amendments pertaining to the Florida Building Code and Fire Code and maintains certifications for approximately 900 building and fire inspectors, plans examiners and building officials.

APPROPRIATIONS

	FY24 Actuals	FY25 Budget	FY26 Budget
Total Expenses	$2,792,706	$16,846,000	$17,781,500
Total Positions	13	13	13

Item 3

Broward County Board of Rules and Appeals

1 N. University Drive Suite 3500B, Plantation, FL 33324
broward.org/CodeAppeals | 954-765-4500 | rulesboard@broward.org

TO: Members of the Broward County Board of Rules and Appeals

FROM: Chief Mechanical Code Compliance Officer

DATE: September 11, 2025

RE: Proposed Formal Interpretation #36 of FBC Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1 Emergency Repairs

Recommendation

It has been recommended that the Board of Rules and Appeals approve, by vote, the proposed Formal Interpretation #36 of FBC Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1 Emergency Repairs.

Reasons

The Broward County Board of Rules and Appeals Mechanical Committee met on August 27, 2025. The Mechanical Committee considered and recommended an interpretation of the above code section.

Additional Information

1. FBC Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1 Emergency Repairs.
2. Draft of Formal Interpretation # 36
3. Mechanical Committee Minutes and Agenda

Respectfully Submitted,

R Soto

Rolando Soto

FBC Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1 Emergency Repairs.

105.2.1 Emergency repairs. Where equipment replacements and repairs must be performed in an emergency, the permit application shall be submitted within the next working business day to the Building Official.

1 N. University Drive, Suite 3500B
Plantation, Florida 33324

Phone: 954-765-4500
Email: rulesboard@broward.org
www.broward.org/CodeAppeals

2025 Voting Members

Chair Robert A. Kamm, P.E.,
Mechanical Engineer

Vice-Chair Stephen Bailey, P.E.,
Electrical Engineer

Eduard C. Badiu, PhD, P.E.,
Roofing Contractor

Mr. Gregg D'Attile,
Mechanical Contractor

Mr. Peter Deveaugh,
Master Electrician

Mr. Jeff Falkanger,
Architect

Mr. Sergio Pellecer,
Fire Service Professional

Mr. Mike Rada,
General Contractor

Mr. Anthony Salgado,
Master Plumber

Mr. Scott Taggart,
Swimming Pool Contractor

Mr. Dennis A. Ulmer,
Consumer Advocate

Mr. Derek A. Wassink, P.E,R.A.,S.I., S.T.S.2.,
Structural Engineer

Ms. Lynn E. Wolfson,
Disabled Community Representative

2025 Alternate Board Members

Mr. Steven Feller, P.E.,
Mechanical Engineer

Mr. Alberto Fernandez,
General Contractor

Mr. Robert Taylor,
Fire Service Professional

Mr. James Terry,
Master Plumber

Mr. David Tringo,
Master Electrician

VACANT
Architect

VACANT
Electrical Engineer

VACANT
Roofing Contractor

VACANT
Structural Engineer

Board Attorney
Charles M. Kramer, Esq.

Administrative Director
Dr. Ana Barbosa

— Established 1971 —

BROWARD COUNTY
BOARD OF RULES AND APPEALS

FBC 8TH EDITION (2023)
FORMAL INTERPRETATION #36

DATE: September 12, 2025
TO: All Building Officials
FROM: Dr. Ana Barbosa, Administrative Director
SUBJECT: Emergency Repairs

At its meeting of September 11, 2025, the Board approved an interpretation of FBC Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1 Emergency repairs.

> **105.2.1 Emergency repairs.** Where equipment replacements and repairs must be performed in an emergency, the permit application shall be submitted within the next working business day to the Building Official.

Formal Interpretation:
Any interruption in the work of the heating, ventilation, and air conditioning system shall be considered an emergency.

EFFECTIVE DATE: September 12, 2025

***** PLEASE POST AT YOUR PERMIT COUNTER *****

DRAFT

Broward County Board of Rules and Appeals
Mechanical Committee
Agenda – August 27, 2025 – 1:30 PM

https://broward-org.zoomgov.com/j/1608042178

Meeting ID: 160 804 2178

1. Roll Call
2. Approval of Minutes – September 14, 2022
3. Requests for Formal Interpretations
    a. Florida Building Code, Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1, Emergency Repairs – Page 3
    b. Florida Building Code – Residential, 8th Edition, Section M1506, Exhaust Openings – Page 4
    c. Florida Mechanical Code, 8th Edition – Broward County Mechanical Technical Amendments, Section 307.2.1, Condensate Disposal – Page 6
4. Public Comment
5. Adjournment

Broward County
Board of Rules and Appeals
1 N. University Drive Suite 3500B, Plantation, FL 33324
Phone: 954-765-4500 | Fax: 954-765-4504
broward.org/CodeAppeals

MEETING OF THE MECHANICAL AND SMOKE CONTROL COMMITTEE,
September 14, 2022, Minutes

Call to Order:
Chair Feller called a published meeting of the Broward County Board of Rules and Appeals Mechanical and Smoke Control Committee to order at 2:00 PM.

The roll was called, and the following members were present:

Robert Taylor	Steven Feller	Jack Walsh
Phil London	Robert Kamm	Julio Briceno
Eric Jenison	Gregg D'Attile	Wesley Neely
Roman Sanchez	Stephen Kerney	Peter McGinnis
Michael Charnin		

Staff: Rolando Soto, Chief Mechanical Code Compliance Officer

Approval of Minutes
Mr. D'Attile made a motion, seconded by Mr. Kamm, to approve the September 22, 2020, Mechanical Committee Meeting Minutes—the motion passed by unanimous vote.

Item 1: Proposed revision to "Broward County Uniform Data Form for Residential and Light Commercial Air Conditioning Replacements"
Mr. Soto explained that the form was approved in 2019 with minor revisions, including "SEER2 and EER2 " under the Data column. " This revision will be effective on January 1st, 2023, and will affect the testing for the AC units. He mentioned the second change: the proposal to remove the word "Model #" on the same page of the application, as it has created confusion in certain cities.

Chair Feller agreed with Mr. Soto and requested a motion to pass these changes. Mr. D'Attile made a motion, seconded by Mr. Walsh, to make these two changes on the Broward County Uniform Data Form, which passed by unanimous vote.

Item 2: Review of proposed Voluntary Residential A/C Replacement Inspection checklist
Mr. Soto explained that he updated this voluntary form, which is intended for chiefs, inspectors, and plans examiners, to have code sections handy when they do plan reviews and inspections in residential AC replacements. Chair Feller said that he was okay with the checklist.

Mr. Briceno made a motion, seconded by Mr. Kamm, to accept the Voluntary Residential A/C replacement inspection checklist—the motion passed by unanimous vote.

Item 3: Review of the proposed Voluntary guideline for solving the existing condenser roof stands running out of space for replacement units
Mr. Soto explained that the proposed voluntary guideline was created because of some issues in old apartment buildings with existing condenser roof stands that do not have enough space because of the large condenser units. The problems were brought to Mr. Soto's attention at the South Florida Association for A/C Contractors meeting.

Chair Feller felt that this is a fact-of-life situation; if the air conditioning system fails or is upgraded, the manufacturer's requirements must be implemented so the system will operate properly. He said every situation could be different, and if the inspectors/contractors need clarifications, they should take them to the Board. Mr. Kamm agreed with Chair Feller on this matter. Discussion followed between the committee members.

Chair Feller suggested that no action should be taken on this subject. Item 3 was dismissed without a motion.

Public Comment

Mr. James DiPietro introduced Dr. Ana Barbosa as the new Board of Rules and Appeals Director. He confirmed that his retirement date will be September 30, 2022. Dr. Barbosa shared her email address and cellphone number with the committee members.

Mr. D'Attile moved to adjourn the meeting, which was seconded by Mr. Taylor. The motion passed by unanimous vote.

Adjournment

Having no further business before the Committee, the meeting adjourned at 2:36 PM.

Item 1. Request for Formal Interpretation of FBC Broward County Amendments,8th Edition, Chapter 1, Section 105.2.1 Emergency repairs.

Mr. Paolo Serafini, the City of Okland Park's Chief Mechanical Inspector, has asked for a Formal Interpretation of section 105.2.1.

> 105.2.1 Emergency repairs. Where equipment replacements and repairs must be performed in an emergency, the permit application shall be submitted within the next working business day to the Building Official.

Staff proposed opinion:

For the purpose of interpreting Section 105.2.1, any interruption of air-conditioning shall be considered an emergency.

Reasons:

The National Weather Service's table below indicates that heat indices meeting or exceeding 103°F can lead to dangerous heat disorders with prolonged exposure and/or physical activity. Temperatures in the 90°F and 100°F range are easily attained in South Florida homes and businesses with a lack of air conditioning.

Caution	**80°F - 90°F**	**Fatigue possible with prolonged exposure and/or physical activity**
Extreme Caution	**90°F - 103°F**	**Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity**
Danger	**103°F - 124°F**	**Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity**
Extreme Danger	**125°F or higher**	**Heat stroke highly likely**

The CDC recommends: "Use fans, but only if indoor temperatures are less than 90°F. In temperatures above 90°F, a fan can increase body temperature."

See https://www.cdc.gov/heat-health/about/index.html

Item 2. Request for Formal Interpretation of FBC Residential, 8th Edition, Section M1506.3 Exhaust openings.

At the August 6, 2025, meeting of the South Florida Air Conditioning Contractor Association, a request was made to provide a Formal Interpretation of section M1506.3 of the FBC Residential. At least one jurisdiction in Broward considers that a picture window (a window without an openable sash) a "non-operable opening" and requires exhaust discharge to comply with the distances required by M1506.3.

> M1506.3 Exhaust openings.
>
> Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.
>
> R303.5.2 Exhaust openings.
>
> Exhaust air shall not be directed onto walkways.
>
> R303.6 Outside opening protection.
>
> Air exhaust and intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles having an opening size of not less than 1/4 inch (6 mm) and a maximum opening size of 1/2 inch (13 mm), in any dimension. Openings shall be protected against local weather conditions. Outdoor air exhaust and intake openings shall meet the provisions for exterior wall opening protectives in accordance with this code.

Staff proposed opinion:

Exhaust discharges near a picture window are not required to comply with FBC Residential Section M1506.3.

Reasons.

The intent of the FBC Residential section M1506.3 is to prevent the reintroduction of the exhausted air into the dwelling. A picture window fully satisfies that intent. Additionally, a similar section in the FMC (501.3.1) has already corrected that glitch by referring only to "operable openings." See FMC text below.

For reference only.

2023 Florida Building Code, Mechanical, Eighth Edition

501.3.1 Location of exhaust outlets.

The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.
2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.
3. For all *environmental air* exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious. Separation is not required between intake air openings and living space exhaust air openings of an individual *dwelling unit* or *sleeping unit* where an approved factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the manufacturer's instructions.
4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the *Florida Building Code, Building* for utilities and attendant equipment.
5. For specific systems see the following sections:

    5.1. Clothes dryer exhaust, Section 504.4.

    5.2. Kitchen hoods and other kitchen exhaust *equipment*, Sections 506.3.13, 506.4 and 506.5.

    5.3. Dust stock and refuse conveying systems, Section 511.2.

    5.4. Subslab soil exhaust systems, Section 512.4.

    5.5. Smoke control systems, Section 513.10.3.

    5.6. Refrigerant discharge, Section 1105.7.

    5.7. Machinery room discharge, Section 1105.6.1.

Item 3. Request for Formal Interpretation of the Broward County Amendments to Chapter 3, subsection 307.2 of the 2023 Florida Building Code - Mechanical, 8th Edition.

Ms. Annette Ben-Habib, a Professional Engineer, with projects in Broward County, has asked for a Formal Interpretation of section 105.2.1. Ms. Ben-Habib specifically seeks clarification of the "Exceptions". In Ms. Ben-Habib's opinion, any individual air conditioning equipment in an apartment building that is less than 65000 BTU/hr should be exempted from compliance with the mentioned amendment. Ms. Ben-Habib has proposed her version of the interpretation. Staff is proposing a different version.

Broward County Amendments to Chapter 3, subsection 307.2 of the 2023 Florida Building Code - Mechanical, 8th Edition.

~~Stricken thru text~~ are deletions from the Florida Building Code - Mechanical, 8th Edition.

Underscored text are additions to Florida Building Code - Mechanical, 8th Edition.

SECTION 307 CONDENSATE DISPOSAL

307.2 Evaporators and cooling coils.

Condensate drain systems shall be provided for *equipment* and *appliances* containing evaporators or cooling coils. Condensate drain systems shall be designed, constructed, and installed in accordance with Sections 307.2.1 through 307.2.5.

Exception: Evaporators and cooling coils that are designed to operate in sensible cooling only and not support condensation shall not be required to meet the requirements of this section.

307.2.1 Condensate disposal.

Condensate from all cooling coils and evaporators of equipment served by an onsite cooling tower in a building or structure wherein the aggregate cooling capacity of the equipment exceeds 65,000 Btu/hr shall be collected and conveyed from the drain pan outlet and discharged to the cooling tower. Where an on-site cooling tower is not installed, the condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley, or other areas so as to cause a nuisance.

Exceptions:

1. Condensate from cooling coils and evaporators is not required to be collected and conveyed to an on-site cooling tower, provided 1.1 through 1.3 are met:

1.1 The equipment comprises 10% or less of the total capacity of the cooling tower system,
1.1 The equipment is located in an isolated or remote area,
1.2 The size of the equipment is 65,000 Btu/hr or less.

2. In existing buildings, condensate may be collected and conveyed to a cooling tower or discharged to an approved place of disposal.

Ms. Ben-Habib Proposed Formal Interpretation

A condensate capture system to return condensate to the onsite cooling tower will not be required if the following three (3) conditions are met:

1. No single piece of HVAC equipment serviced by the cooling tower is greater than 10% of the total cooling tower capacity. Ie, if the cooling tower is 100 Tons, no piece of cooling equipment is larger than 120 MBH (10 tons).

2. Any piece of HVAC equipment that creates a condensate return loop to the tower that would increase the building system's total length of condensate piping by 50% or more as compared to a direct drainage piping system is considered ""isolated" or "remote".

3. No single piece of HVAC equipment serviced by the cooling tower is larger than 65,000 Btu/Hr.

In summary, if a cooling tower system is serving a very large or tall building comprised of only very small pieces of HVAC equipment, the building should be exempt from the installation of a condensate capture system based on the proposed interpretation of the Amendment. The intent of the amendment is to reduce water usage in cooling tower systems by reusing condensate; however, with very small HVAC units, the amount of condensate captured from each unit is negligible compared to the overall cooling tower usage, at less than .001% of the tower makeup. The amount of piping required to service these small units in a large building is a large burden on the owner or developer and will also require extensive water use for cleaning purposes. It is entirely possible that the amount of water required to clean the condensate capture loop with be greater than the condensate that is captured and returned to the tower.

Staff proposed opinion:

Individual air conditioning equipment in an apartment building with less than 65000 BTU/hr that does not meet all the conditions listed in the Exceptions to FMC Section 307.2.1 is not exempt from compliance with the mentioned amendment.

Reasons.

The Exceptions state:

1. Condensate from cooling coils and evaporators is not required to be collected and conveyed to an on-site cooling tower, provided 1.1 through 1.3 are met:

1.1 The equipment comprises 10% or less of the total capacity of the cooling tower system,

1.1 The equipment is located in an isolated or remote area,

1.2 The size of the equipment is 65,000 Btu/hr or less.

To qualify for the exception, all the conditions from 1.1 to 1.3 must be met. Section 307.2.1's intention is to collect the condensate discharge from all and any equipment in the building. The exception intention is to remove the burden of collecting condensate from small and remote units, where the expense and difficulty of compliance do not justify the benefit of collecting a small amount of water for reuse.

From:	Annette Ben-Habib, PE
To:	Soto, Rolando; Barbosa, Ana
Cc:	Joseph, Jonda
Subject:	RE: Board Consideration of SECTION M314.2.1 CONDENSATE DISPOSAL
Date:	Thursday, August 21, 2025 3:49:43 PM
Attachments:	image004.png image005.png image006.png image007.png

External Email Warning

This email originated from outside the Broward County email system. Do not reply, click links, or open attachments unless you recognize the sender's email address (not just the name) as legitimate and know the content is safe. Report any suspicious emails to ETS Security by selecting the Report Suspicious or Report Phish button.

Report Suspicious

Thank you for the opportunity to propose a formal interpretation of this amendment. Please see below and let me know if you needed another format from me, or any additional language.

[M] 314.2.1 Condensate drainage collection, use or **disposal.** Condensate from all cooling coils and evaporators of equipment served by an onsite cooling tower in a building or structure wherein the aggregate cooling capacity of the equipment exceeds 65,000 Btu/hr shall be collected and conveyed from the drain pan outlet and discharged to the cooling tower. Where an on-site cooling tower is not installed the condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal.

Exceptions:

1. Condensate from cooling coils and evaporators is not required to be collected and conveyed to an on-site cooling tower: provided 1.1 through 1.3 are met:

   1.1 The equipment comprises 10% or less of the total capacity of the cooling tower system
   1.2 The equipment is located in an isolated or remote area
   1.3 The size of the equipment is 65,000 Btu/hr or less

2. In existing buildings, condensate may be collected and conveyed to a cooling tower or discharged to an approved place of disposal.

I am proposing the following Formal Interpretation of the Exception 1 comprised of 1.1, 1.2 and 1.3.

Proposed Formal Interpretation

A condensate capture system to return condensate to the onsite cooling tower will not be required if the following three (3) conditions are met:

1. No single piece of HVAC equipment serviced by the cooling tower is greater than 10% of the total cooling tower capacity. Ie, if the cooling tower is 100 Tons, no piece of cooling equipment is larger than 120 MBH (10 tons).

2. Any piece of HVAC equipment that creates a condensate return loop to the tower that would increase the building system's total length of condensate piping by 50% or more as compared to a direct drainage piping system is considered ""isolated" or "remote".

3. No single piece of HVAC equipment serviced by the cooling tower is larger than 65,000 Btu/Hr.

In summary, if a cooling tower system is serving a very large or tall building comprised of only very small pieces of HVAC equipment, the building should be exempt from the installation of a condensate capture system based on the proposed interpretation of the Amendment. The intent of the amendment is to reduce water usage in cooling tower systems by reusing condensate; however, with very small HVAC units, the amount of condensate captured from each unit is negligible compared to the overall cooling tower usage, at less than .001% of the tower makeup. The amount of piping required to service these small units in a large building is a large burden on the owner or developer and will also require extensive water use for cleaning purposes. It is entirely possible that the amount of water required to clean the condensate capture loop with be greater than the condensate that is captured and returned to the tower.

Annette Ben-Habib, PE
Associate

Phone 954 990-0556
Mobile 954 654-9465

From: Soto, Rolando <ROSOTO@broward.org>
Sent: Wednesday, August 20, 2025 1:47 PM
To: Annette Ben-Habib, PE <aben-habib@ceseng.com>
Cc: Joseph, Jonda <JONDAJOSEPH@broward.org>
Subject: RE: Board Consideration of SECTION M314.2.1 CONDENSATE DISPOSAL

Good afternoon, Ms. Ben-Habib,
I apologize for the last-minute information. It looks like we will have a Mechanical Committee meeting next week on Wednesday, August 27, 2025, at 1.30. It will be Zoom. We will send you the link. I'm planning to ask the committee for an interpretation of the **Broward County Amendments to Chapter 3, subsection 307.2 of the 2023 Florida Building Code - Mechanical, 8th Edition.** If you would like to provide language for the committee's consideration, it will have to be no later than Friday, 8/22/25.
Respectfully,

Rolando Soto
Mechanical Chief Code Compliance Officer
Broward Co. Board of Rules and Appeals
1 N University Dr. Suite 3500B
Plantation Fl 33324
954-765-4500
http://www.broward.org/CodeAppeals/Pages/Default.aspx

STRONGER CODES MEAN SAFER BUILDINGS
~ESTABLISHED 1971~

Broward County Board of Rules and Appeals
Mechanical Committee
August 27, 2025 Meeting Minutes
https://broward-org.zoomgov.com/j/1608042178
Meeting ID: 160 804 2178

Mr. Gregg D'Attile called a published meeting of the Mechanical Committee to order at 1:44 PM.

1. Roll Call

Gregg D'Attile	Robert A. Kamm
Phil London	Jack Walsh
Wesley Neely	Christopher Figueras
Eric Jenison	Michael Charnin
Roman Sanchez	Peter McGinnis

2. Approval of Minutes – September 14, 2022

   Mr. London made a motion, and Mr. McGinnis seconded the motion to approve the September 14, 2022, minutes as submitted. The motion passed by unanimous vote of 10-0.

3. Requests for Formal Interpretations

   a. Florida Building Code, Broward County Amendments, 8th Edition, Chapter 1, Section 105.2.1, Emergency Repairs – Page 3

      Mr. Rolando Soto, Chief Mechanical Code Compliance Officer, indicated that the request from the City of Oakland Park's Chief Mechanical Inspector constitutes an emergency in the case of air conditioning. The staff's recommendation is that any lack of air conditioning should be considered an emergency. He did not think there could be a distinction between the individual's age and/or condition.

      In response to Mr. D'Attile, Mr. Soto advised that a change to the Code is different from what was proposed, which is an interpretation of the Code.

      Mr. Paulo Serafini explained that it will be difficult to track whether the individual has applied for a permit after claiming an emergency. Mr. Sanchez pointed out that the role of the Chief Inspector is to determine which cases are emergencies and, as such, track them. Mr. Soto noted that the information provided in the agenda shows the temperatures inside a building, but temperatures outside the building could vary widely. Mr. Kamm commented that it could also be cold weather. The key is a speedy building permit application. It should be easy to track. Mr. Soto felt the interpretation would provide countywide consistency. Mr. London agreed that it should not be linked solely to temperature. Mr. Kamm fully supported the staff

recommendation but would like to change air conditioning to air conditioning, heating, and ventilation.

Mr. Kamm made a motion, and Mr. Jenison seconded the motion, to approve recommending the formal interpretation as revised to specify air conditioning, heating, and ventilation systems. The motion passed by a unanimous vote of 10-0.

b. Florida Building Code – Residential, 8th Edition, Section M1506, Exhaust Openings – Page 4

Mr. Rolando Soto, Chief Mechanical Code Compliance Officer, noted at the August 6th meeting of the South Florida Association of Air Conditioning Contractors that this issue was raised. Some inspectors have interpreted a picture window to be a non-operable opening, and therefore, the exhaust has to be a minimum of three feet away. Some inspectors in at least one jurisdiction are using this language to deny permits. A non-operable opening means a louver with fixed blades that cannot be closed. Air will not go through a solid piece of glass.

In response to Mr. D'Attile, Mr. Soto clarified that the recommendation is not for a code amendment, but rather a formal interpretation, which is permissible.

Mr. Kamm made a motion, and Mr. Charnin seconded the motion to approve recommending the formal interpretation. The motion passed by unanimous vote of 10-0.

c. Florida Mechanical Code, 8th Edition – Broward County Mechanical Technical Amendments, Section 307.2.1, Condensate Disposal – Page 6

Mr. Rolando Soto, Chief Mechanical Code Compliance Officer, advised that this is a request from Ms. Annette Ben-Habib, a Professional Engineer with projects in Broward County. Ms. Ben-Habib believes that any individual air conditioning equipment in an apartment building that is less than 65000 BTU/hr should be exempted from this technical amendment. The Committee has been provided with Ms. Ben-Habib's proposed formal interpretation.

Ms. Ben-Habib referred to the second provision specifying that the equipment is isolated or remote, which is vague. If the cooling tower is for a high-rise building and piping is back to the first floor or roof, it is remote. In reality, because of the distance of piping, it is a considerable waste of water for a small amount saved. Moreover, the cost for such extensive piping has an impact on the developer and building owner. Her proposal is to define remote or isolated if the return of the condensate will result in 50% or more piping, and it would not be necessary to capture any condensate.

Mr. Soto brought attention to the staff's proposal provided in the agenda backup. Ms. Ben-Habib's proposal would mean that the condensate in an apartment building would not be required to be collected, which would equate to a huge amount of water for the entire building. All three of the exceptions must be met in order to be

exempt. He pointed out that the condensate water risers are required regardless. The additional work would be to join the risers and pump back to the cooling tower. Remoteness would relate to a unit that is feeding a cabana on a swimming pool that is on the opposite side of the building. In this instance, the benefits of collecting that water might be minimal, but completely opposite to two hundred AC units in a building, for example. Although one unit is small, in total, a lot of water is being collected.

Ms. Ben-Habib explained that if there is a separate water supply to the cooling tower, it makes sense to capture the water. However, if one water meter is being fed from a regular water distribution system, it means hundreds of feet of piping.

Mr. Soto commented that communities near the coastline are facing saltwater intrusion. Cooling towers are huge users of water. Any water savings would be a help. It would save money for the building and additional capacity for the water utility. Ms. Ben-Habib commented that when the units are very small, the amount of capacity and the amount of condensate are small. She did not think it is necessarily a savings because condensate requires piping and cleaning. The cost-benefit value is much smaller with very small equipment. Mr. Soto disagreed; if there are two hundred two-ton units in a building, it equates to 4 hundred tons of AC. Ms. Ben-Habib noted that the units will run a little less than the maximum. There is a significant amount of water produced by the running of the equipment.

Mr. Kamm felt no building official would object to a cabana for a swimming pool being considered remote. Mr. Figueras felt it should be analyzed on a case-by-case basis. Mr. D'Attile indicated the code provides that if there is 1,000 feet of condensation collection piping and more than 1,000 feet is required for the return, it would be considered remote. Mr. Kamm felt that the engineer of record as opposed to the building official, should make the determination of it being remote. Both Mr. Figueras and Mr. Walsh concurred.

Mr. Kamm made a motion, and Mr. London seconded the motion, to specify, regarding 307.2.1.1, that the engineer of record determine if the equipment is located in an isolated or remote area. The motion passed by a unanimous vote of 10-0.

4. Public Comment - none

5. Adjournment

The meeting adjourned at 2:32 PM.

Item 4

Broward County Board of Rules and Appeals

1 N. University Drive Suite 3500B, Plantation, FL 33324

broward.org/CodeAppeals | 954-765-4500 | rulesboard@broward.org

TO: Members of the Broward County Board of Rules and Appeals

FROM: Chief Mechanical Code Compliance Officer

DATE: September 11, 2025

RE: Proposed Formal Interpretation #37 of FBC Residential, 8th Edition, Section M1506.3 Exhaust Openings

Recommendation

It has been recommended that the Board of Rules and Appeals approve, by vote, the proposed Formal Interpretation #37 of FBC Residential, 8th Edition, Section M1506.3 Exhaust Openings.

Reasons

The Broward County Board of Rules and Appeals Mechanical Committee met on August 27, 2025. The Mechanical Committee considered and recommended an interpretation of the above code section.

Additional Information

1. FBC Residential, 8th Edition, Section M1506.3 Exhaust Openings
2. Draft of Formal Interpretation # 37

Respectfully Submitted,

R Soto

Rolando Soto

FBC Residential, 8th Edition, Section M1506.3 Exhaust Openings.

M1506.3 Exhaust openings.
Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

1 N. University Drive, Suite 3500B
Plantation, Florida 33324

Phone: 954-765-4500
Email: rulesboard@broward.org
www.broward.org/CodeAppeals

2025 Voting Members

Chair Robert A. Kamm, P.E.,
Mechanical Engineer

Vice-Chair Stephen Bailey, P.E.,
Electrical Engineer

Eduard C. Badiu, PhD, P.E.,
Roofing Contractor

Mr. Gregg D'Attile,
Mechanical Contractor

Mr. Peter Deveaugh,
Master Electrician

Mr. Jeff Falkanger,
Architect

Mr. Sergio Pellecer,
Fire Service Professional

Mr. Mike Rada,
General Contractor

Mr. Anthony Salgado,
Master Plumber

Mr. Scott Taggart,
Swimming Pool Contractor

Mr. Dennis A. Ulmer,
Consumer Advocate

Mr. Derek A. Wassink, P.E,R.A.,S.I., S.T.S.2.,
Structural Engineer

Ms. Lynn E. Wolfson,
Disabled Community Representative

2025 Alternate Board Members

Mr. Steven Feller, P.E.,
Mechanical Engineer

Mr. Alberto Fernandez,
General Contractor

Mr. Robert Taylor,
Fire Service Professional

Mr. James Terry,
Master Plumber

Mr. David Tringo,
Master Electrician

VACANT
Architect

VACANT
Electrical Engineer

VACANT
Roofing Contractor

VACANT
Structural Engineer

Board Attorney
Charles M. Kramer, Esq.

Administrative Director
Dr. Ana Barbosa

— Established 1971 —

BROWARD COUNTY
BOARD OF RULES AND APPEALS

FBC 8TH EDITION (2023)
FORMAL INTERPRETATION #37

DATE: September 12, 2025
TO: All Building Officials
FROM: Dr. Ana Barbosa, Administrative Director
SUBJECT: Exhaust Openings

At its meeting of September 11, 2025, the Board approved an interpretation of FBC Residential, 8th Edition, Section M1506.3 Exhaust openings.

> **M1506.3 Exhaust openings.**
> Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

Formal Interpretation:
A picture window cannot be opened to the exterior; therefore, it is not a building opening from the standpoint of air movement. Exhaust discharges near a picture window shall not be required to comply with FBC Residential Section M1506.3.

EFFECTIVE DATE: September 12, 2025

***** PLEASE POST AT YOUR PERMIT COUNTER *****

DRAFT

REFER TO ITEM #3 FOR THE MECHANICAL COMMITTEE AGENDA AND MINUTES

Item 5

Broward County Board of Rules and Appeals

1 N. University Drive Suite 3500B, Plantation, FL 33324

broward.org/CodeAppeals | 954-765-4500 | rulesboard@broward.org

TO: Members of the Broward County Board of Rules and Appeals

FROM: Chief Mechanical Code Compliance Officer

DATE: September 11, 2025

RE: Proposed Formal Interpretation #38 of Broward County Amendments to Chapter 3, Subsection 307.2.1 of the 2023 Florida Building Code – Mechanical, 8th Edition

Recommendation

It has been recommended that the Board of Rules and Appeals approve, by vote, the proposed Formal Interpretation #38 of Broward County Amendments to Chapter 3, subsection 307.2.1 of the 2023 Florida Building Code - Mechanical, 8th Edition.

Reasons

The Broward County Board of Rules and Appeals Mechanical Committee met on August 27, 2025. The Mechanical Committee considered and recommended an interpretation of the above code section.

Additional Information

1. Broward County Amendments to Chapter 3, Subsection 307.2.1 of the Florida Building Code, Mechanical, 8th Edition
2. Draft of Formal Interpretation # 38

Respectfully Submitted,

R Soto

Rolando Soto

Broward County Amendments to Chapter 3, Subsection 307.2.1 of the Florida Building Code – Mechanical, 8th Edition

307.2.1 Condensate disposal.
Condensate from all cooling coils and evaporators of equipment served by an onsite cooling tower in a building or structure wherein the aggregate cooling capacity of the equipment exceeds 65,000 Btu/hr shall be collected and conveyed from the drain pan outlet and discharged to the cooling tower. Where an on-site cooling tower is not installed, the condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley, or other areas so as to cause a nuisance.

Exceptions:
1. Condensate from cooling coils and evaporators is not required to be collected and conveyed to an on-site cooling tower, provided 1.1 through 1.3 are met:
1.1 The equipment comprises 10% or less of the total capacity of the cooling tower system,
1.2 The equipment is located in an isolated or remote area,
1.3 The size of the equipment is 65,000 Btu/hr or less.
2. In existing buildings, condensate may be collected and conveyed to a cooling tower or discharged to an approved place of disposal.

1 N. University Drive, Suite 3500B
Plantation, Florida 33324

Phone: 954-765-4500
Email: rulesboard@broward.org
www.broward.org/CodeAppeals

2025 Voting Members

Chair Robert A. Kamm, P.E.,
Mechanical Engineer

Vice-Chair Stephen Bailey, P.E.,
Electrical Engineer

Eduard C. Badiu, PhD, P.E.,
Roofing Contractor

Mr. Gregg D'Attile,
Mechanical Contractor

Mr. Peter Deveaugh,
Master Electrician

Mr. Jeff Falkanger,
Architect

Mr. Sergio Pellecer,
Fire Service Professional

Mr. Mike Rada,
General Contractor

Mr. Anthony Salgado,
Master Plumber

Mr. Scott Taggart,
Swimming Pool Contractor

Mr. Dennis A. Ulmer,
Consumer Advocate

Mr. Derek A. Wassink, P.E,R.A.,S.I., S.T.S.2.,
Structural Engineer

Ms. Lynn E. Wolfson,
Disabled Community Representative

2025 Alternate Board Members

Mr. Steven Feller, P.E.,
Mechanical Engineer

Mr. Alberto Fernandez,
General Contractor

Mr. Robert Taylor,
Fire Service Professional

Mr. James Terry,
Master Plumber

Mr. David Tringo,
Master Electrician

VACANT
Architect

VACANT
Electrical Engineer

VACANT
Roofing Contractor

VACANT
Structural Engineer

Board Attorney
Charles M. Kramer, Esq.

Administrative Director
Dr. Ana Barbosa

— Established 1971 —

BROWARD COUNTY
BOARD OF RULES AND APPEALS

FBC 8TH EDITION (2023)
FORMAL INTERPRETATION #38

DATE: September 12, 2025
TO: All Building Officials
FROM: Dr. Ana Barbosa, Administrative Director
SUBJECT: Condensate Disposal

At its meeting on September 11, 2025, the Board approved an interpretation of Broward County Amendments to Chapter 3, Subsection 307.2.1 of the 2023 Florida Building Code – Mechanical, 8th Edition.

307.2.1 Condensate disposal.
Condensate from all cooling coils and evaporators of equipment served by an onsite cooling tower in a building or structure wherein the aggregate cooling capacity of the equipment exceeds 65,000 Btu/hr shall be collected and conveyed from the drain pan outlet and discharged to the cooling tower. Where an on-site cooling tower is not installed, the condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley, or other areas so as to cause a nuisance.

Exceptions:
1. Condensate from cooling coils and evaporators is not required to be collected and conveyed to an on-site cooling tower, provided 1.1 through 1.3 are met:
1.1 The equipment comprises 10% or less of the total capacity of the cooling tower system,
1.2 The equipment is located in an isolated or remote area,
1.3 The size of the equipment is 65,000 Btu/hr or less.
2. In existing buildings, condensate may be collected and conveyed to a cooling tower or discharged to an approved place of disposal.

Formal Interpretation:
To qualify for the exception, all the conditions from 1.1 to 1.3 must be met. The Designer of Record shall determine what equipment is considered isolated or remote.

EFFECTIVE DATE: September 12, 2025

***** PLEASE POST AT YOUR PERMIT COUNTER *****

DRAFT

REFER TO ITEM #3 FOR THE MECHANICAL COMMITTEE AGENDA AND MINUTES